

Music Fundamentals 1: Pitch and Major Scales and Keys

Collection Editor:

Terry B. Ewell

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Collection Editor:

Terry B. Ewell

Authors:

Terry B. Ewell
Catherine Schmidt-Jones

Online:

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C O N N E X I O N S

Rice University, Houston, Texas

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Chapter 1

Introduction to Pitch Notation in Music¹

Music is principally written with symbols specifying pitch and symbols specifying timing. Symbols indicating pitch give instructions on whether sounds are high or low or anywhere in between. Symbols indicating timing provide instructions on when and how long to play or sing a sound. These symbols are combined in ingenuous ways for music notation. When you master the fundamentals of music literacy, you will be able to read much of the music performed in the world today. The notation is commonly termed “Western Musical Notation.”

In this module we will present pitch notation. “Pitch” is a word we use for indicating where a note lies in a spectrum or range of musical tones. Musical pitches are designated by an alphabet letter or sometimes by a solfège syllable.

The musical alphabet uses letters A B C D E F G. Common solfège syllables are: Do Re Mi Fa Sol La Ti. In many countries the solfège syllables are employed to designate pitches. For instance, in France, “Do” is the name for “C,” “Re” for “D,” etc. This system of labeling pitches is termed “fixed Do,” since Do always designates the note C. In America we most commonly designate pitches by their alphabet letter name.

The musical alphabet repeats throughout the range or register of music. For instance, notice that the piano keyboard below has a repeating musical alphabet (given below the keyboard in Figure 1):

A Portion of the Piano Keyboard



Figure 1.1: The graphics of the keyboard in Figure 1 are modified from Tobias R. – Metoc², <http://en.wikipedia.org/wiki/File:Klaviatur-3-en.svg>³ (Accessed 01 May 09). It is licensed for public use under the Creative Commons Attribution License.

¹This content is available online at <<http://cnx.org/content/m22934/1.1/>>.

²<http://commons.wikimedia.org/wiki/User:Metoc>

³<http://en.wikipedia.org/wiki/File:Klaviatur-3-en.svg>

Pitches furthest on the left are lower sounding. Higher and higher pitches are sounded by moving up the piano keyboard in the right hand direction.

Pitches are represented by “notes” placed on a “staff.” The most common staff in musical notation is one with five lines and four spaces.

A Staff

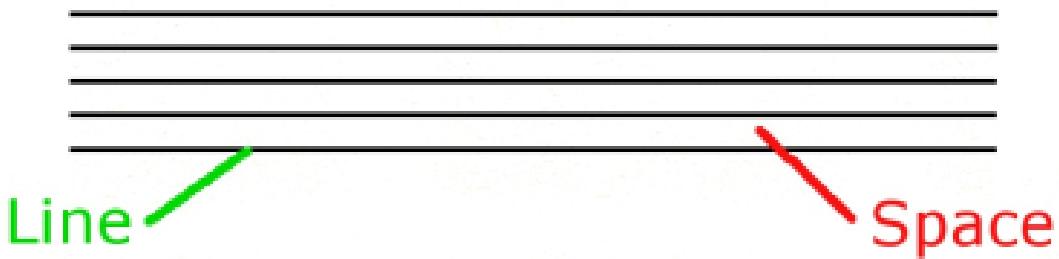


Figure 1.2

The lower part of the staff is for lower notes; the higher portion is for higher notes. The staff by itself, however, doesn’t provide us the information we need to designate the position of a pitch. There are many more pitches in most music than just those provided by these five lines and four spaces. For the wider range of musical pitches we need a group of musical symbols called “clefs.” Some of the clefs used in music notation matched the names given to voices: soprano, mezzo soprano, alto, tenor, bass. For now we will just introduce two of the most common clefs—treble and bass.

The treble clef or G clef designates the staff for higher pitched instruments such as flute, trumpet, or violin. The clef circles around a line that is G, which is the second line from the bottom. The blue letter G doesn’t usually appear in music notation. The red note on the treble staff is a G. The bass or F clef designates a staff reserved for lower pitched instruments such as bassoon, tuba, or cello. The left most portion of the clef starts on the F line—4th line from the bottom. The F line also appears between the two dots to the right of the clef. The red note on the bass staff is an F.



Figure 1.3

The treble and bass staves are often paired in piano music with the "grand staff" or "piano staff." The grand staff features a brace, bar and then the two staves.

The Grand or Piano Staff

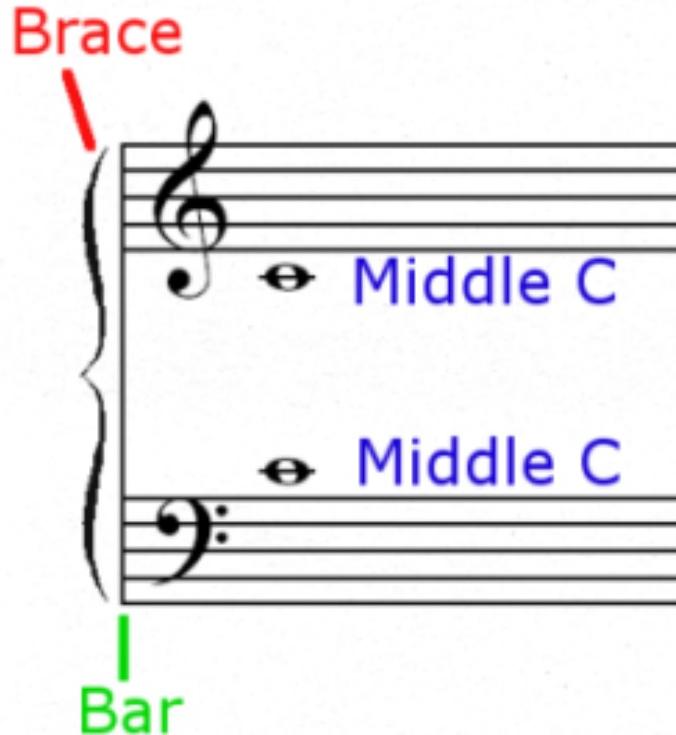


Figure 1.4

Description The grand staff is used for keyboard instruments such as piano, organ, and harpsichord.

Notice the position of “middle C” on the grand staff. It is below the treble staff and above the bass staff. This note is called middle C because it is the C that is located in the middle of the piano keyboard.

This video gives a further demonstration of the location of middle C and introduces the piano keyboard:

Introduction to the piano keyboard (11 minutes) RealPlayer⁴ ⁵ | Windows Media⁶ | iPod or QuickTime Player⁷ ⁸ (mp4)

You will also notice that a short line segment appears in the middle of the note in Figure 4. This short line is called a “ledger line.” These added lines are a bit similar to ladders. They are extensions of the staff, either above or below, so that additional pitches may be given in the music. Figure 5 below gives a high C above the treble staff and a low C below the bass staff.

⁴<http://terryewell.com/tu/theory/TheoryIntro.ram>

⁵<http://terryewell.com/tu/theory/TheoryIntro.ram>

⁶<http://terryewell.com/tu/theory/TheoryIntro.wmv>

⁷<http://terryewell.com/tu/theory/TheoryIntro.mp4>

⁸<http://terryewell.com/tu/theory/TheoryIntro.mp4>



Figure 1.5

Chapter 2

Clef¹

NOTE: Are you really free to use this online resource? Join the discussion at Opening Measures².

2.1 Treble Clef and Bass Clef

The first symbol that appears at the beginning of every music staff³ is a **clef symbol**. It is very important because it tells you which note⁴ (A, B, C, D, E, F, or G) is found on each line or space. For example, a **treble clef** symbol tells you that the second line from the bottom (the line that the symbol curls around) is "G". On any staff, the notes are always arranged so that the next letter is always on the next higher line or space. The last note letter, G, is always followed by another A.

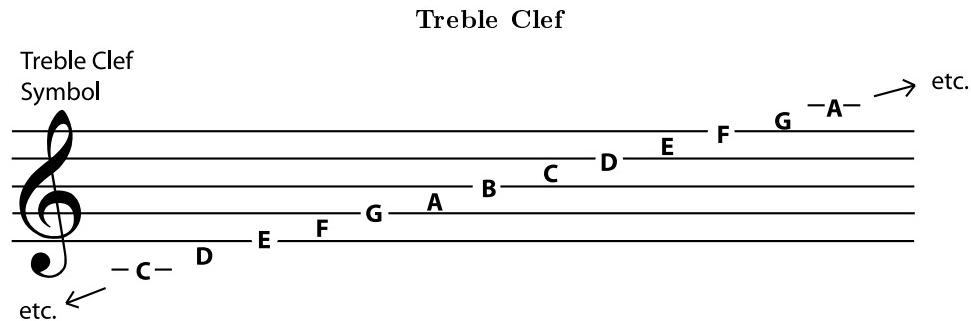


Figure 2.1

A **bass clef** symbol tells you that the second line from the top (the one bracketed by the symbol's dots) is F. The notes are still arranged in ascending order, but they are all in different places than they were in treble clef.

¹This content is available online at <<http://cnx.org/content/m10941/2.19/>>.

²<http://openingmeasures.com/open-education/40/are-the-education-resources-at-Connexions-really-free/>

³"The Staff" <<http://cnx.org/content/m10880/latest/>>

⁴"Duration: Note Lengths in Written Music" <<http://cnx.org/content/m10945/latest/>>

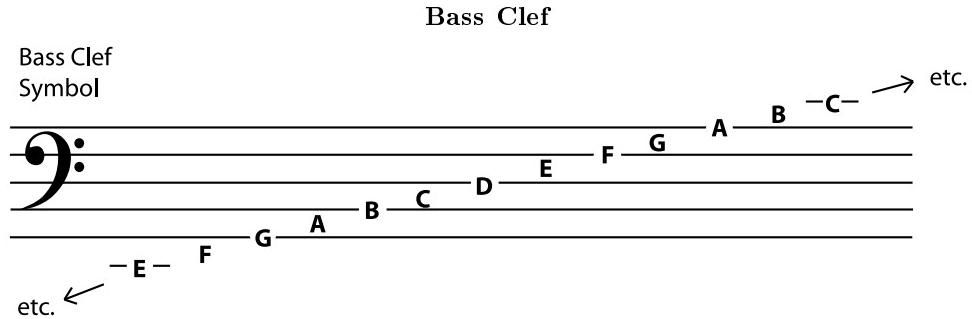


Figure 2.2

2.2 Memorizing the Notes in Bass and Treble Clef

One of the first steps in learning to read music in a particular clef is memorizing where the notes are. Many students prefer to memorize the notes and spaces separately. Here are some of the most popular mnemonics used.

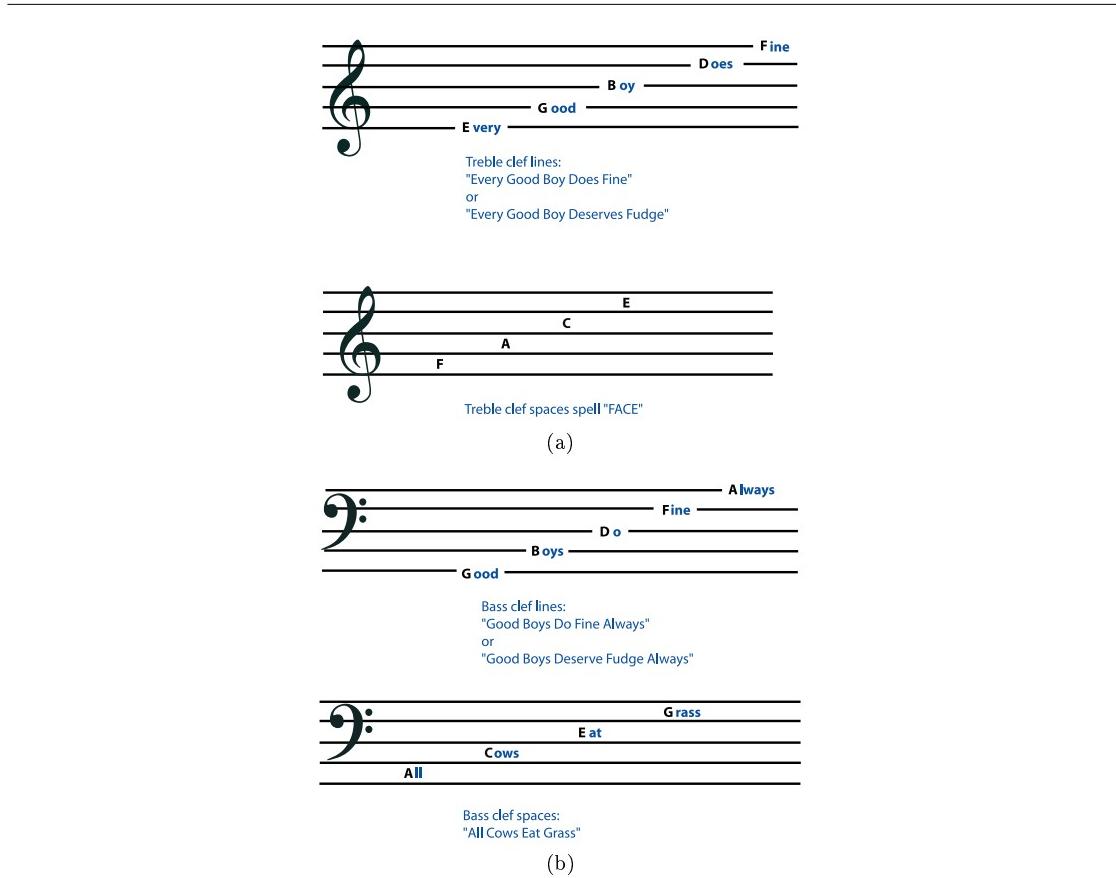


Figure 2.3: You can use a word or silly sentence to help you memorize which notes belong on the lines or spaces of a clef. If you don't like these ones, you can make up your own.

2.3 Moveable Clefs

Most music these days is written in either bass clef or treble clef, but some music is written in a **C clef**. The C clef is moveable: whatever line it centers on is a middle C⁵.

⁵"Octaves and the Major-Minor Tonal System" <<http://cnx.org/content/m10862/latest/#p2bb>>

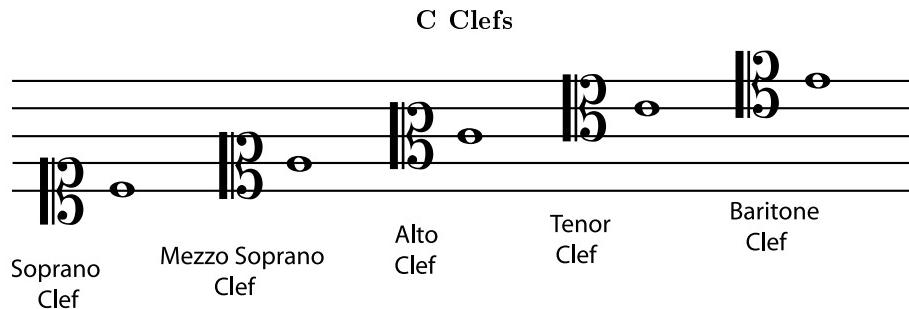


Figure 2.4: All of the notes on this staff are middle C.

The bass and treble clefs were also once moveable, but it is now very rare to see them anywhere but in their standard positions. If you do see a treble or bass clef symbol in an unusual place, remember: treble clef is a **G clef**; its spiral curls around a G. Bass clef is an **F clef**; its two dots center around an F.

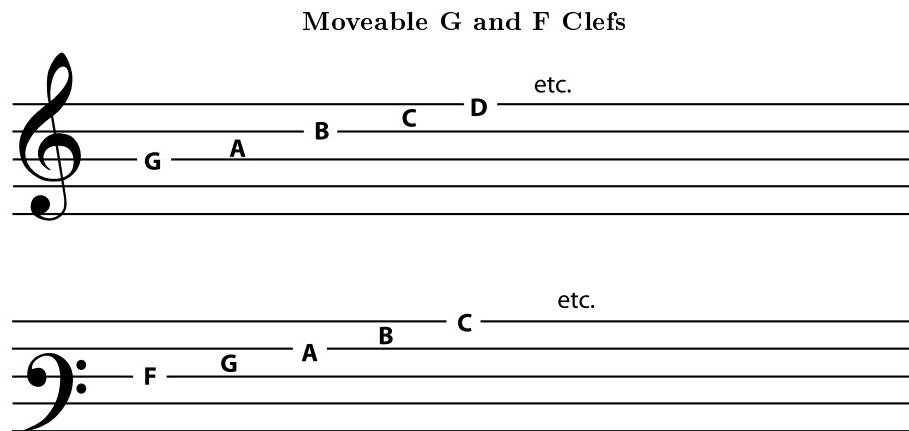


Figure 2.5: It is rare these days to see the G and F clefs in these nonstandard positions.

Much more common is the use of a treble clef that is meant to be read one octave below the written pitch. Since many people are uncomfortable reading bass clef, someone writing music that is meant to sound in the region of the bass clef may decide to write it in the treble clef so that it is easy to read. A very small "8" at the bottom of the treble clef symbol means that the notes should sound one octave lower than they are written.

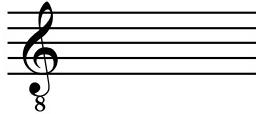


Figure 2.6: A small "8" at the bottom of a treble clef means that the notes should sound one octave lower than written.

2.4 Why use different clefs?

Music is easier to read and write if most of the notes fall on the staff and few ledger lines⁶ have to be used.

Figure 2.7: These scores show the same notes written in treble and in bass clef. The staff with fewer ledger lines is easier to read and write.

The G indicated by the treble clef is the G above middle C⁷, while the F indicated by the bass clef is the F below middle C. (C clef indicates middle C.) So treble clef and bass clef together cover many of the notes that are in the range⁸ of human voices and of most instruments. Voices and instruments with higher ranges usually learn to read treble clef, while voices and instruments with lower ranges usually learn to read bass clef. Instruments with ranges that do not fall comfortably into either bass or treble clef may use a C clef or may be transposing instruments⁹.

⁶"The Staff" <<http://cnx.org/content/m10880/latest/#p1a>>

⁷"Octaves and the Major-Minor Tonal System" <<http://cnx.org/content/m10862/latest/#p2bb>>

⁸"Range" <<http://cnx.org/content/m12381/latest/>>

⁹"Transposing Instruments" <<http://cnx.org/content/m10672/latest/>>

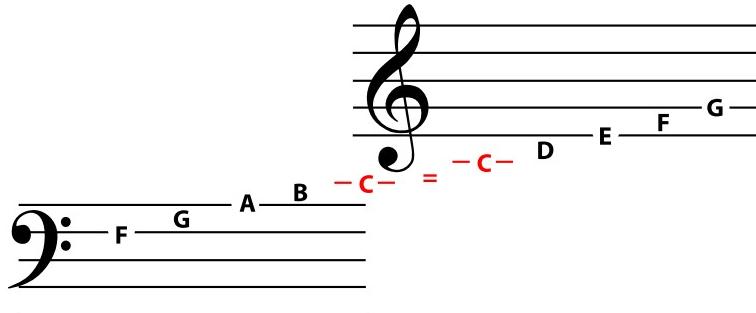


Figure 2.8: Middle C is above the bass clef and below the treble clef; so together these two clefs cover much of the range of most voices and instruments.

Exercise 2.1

(*Solution on p. 15.*)

Write the name of each note below the note on each staff in Figure 2.9.

Three staves of music notation. The top staff uses a treble clef (G), the middle staff uses a bass clef (F), and the bottom staff uses an alto clef (C). Each staff contains six notes, with the first note being a quarter note and the subsequent five being eighth notes. The notes are distributed across the four lines and four spaces of each staff.

Figure 2.9

Exercise 2.2

(*Solution on p. 15.*)

Choose a clef in which you need to practice recognizing notes above and below the staff in Figure 2.10. Write the clef sign at the beginning of the staff, and then write the correct note names below each note.

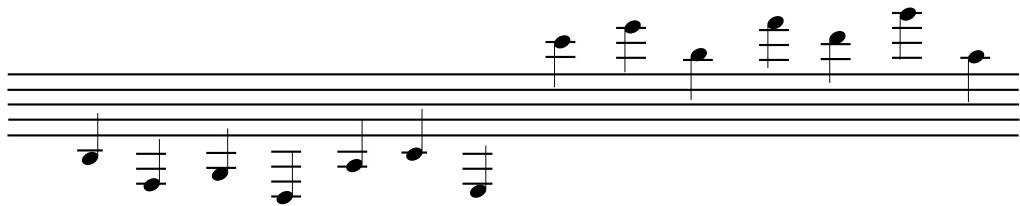


Figure 2.10

Exercise 2.3

(*Solution on p. 16.*)

Figure 2.11 gives more exercises to help you memorize whichever clef you are learning. You may print these exercises as a PDF worksheet¹⁰ if you like.

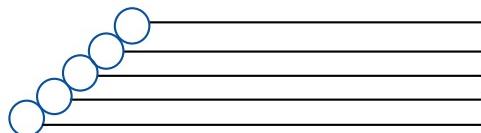
¹⁰See the file at <<http://cnx.org/content/m10941/latest/ClefWorksheet.pdf>>

Clef Practice

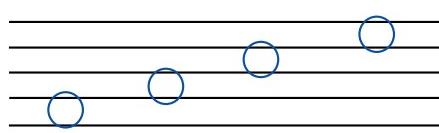
Practice writing your clef symbol on this staff. Write at least eight clef symbols



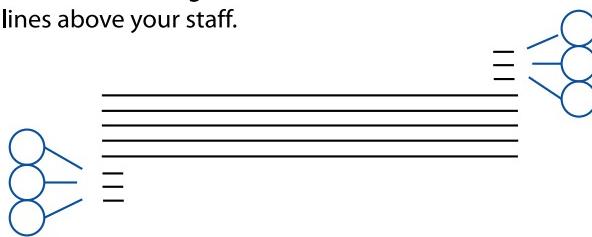
Write the letter names of the lines in your staff:



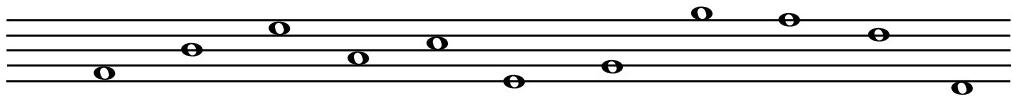
Write the letter names of the spaces:



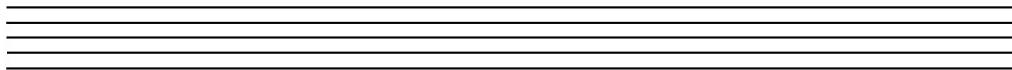
Write the letter names of the three ledger lines below and the three ledger lines above your staff.



Write your clef symbol at the beginning of this line.
Then write the correct letter name above each note.



Write your clef symbol at the beginning of this line.
Then write a note in the staff for each letter below the staff.



C G F D E A B

Figure 2.11

Solutions to Exercises in Chapter 2

Solution to Exercise 2.1 (p. 12)

The figure consists of three staves of musical notation. The top staff uses a treble clef, the middle staff a bass clef, and the bottom staff an alto clef. Each staff has five horizontal lines. Below each staff, a series of notes are labeled with letters corresponding to their pitch names. The notes are black dots with stems extending either up or down. The labels are as follows:

- Treble staff: E, B, C, G, E, A, D, D, B, C, G.
- Bass staff: G, D, E, B, G, C, F, F, D, E, B.
- Alto staff: F, C, D, A, F, B, E, E, C, D, A.

Figure 2.12

Solution to Exercise 2.2 (p. 12)

Figure 2.13 shows the answers for treble and bass clef. If you have done another clef, have your teacher check your answers.

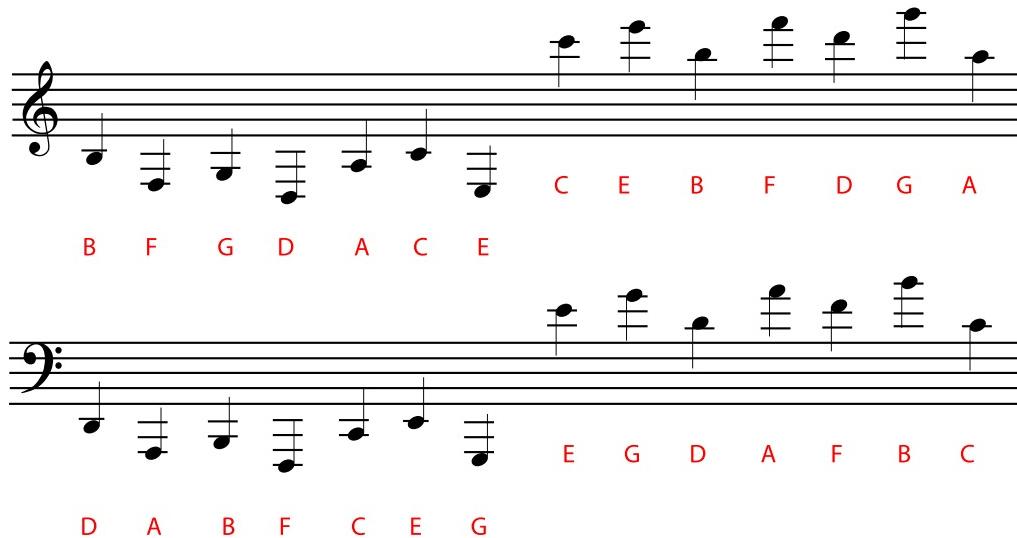


Figure 2.13

Solution to Exercise 2.3 (p. 13)

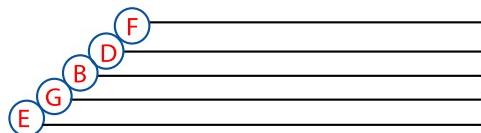
Figure 2.14 shows the answers for treble clef, and Figure 2.15 the answers for bass clef. If you are working in a more unusual clef, have your teacher check your answers.

Clef Practice

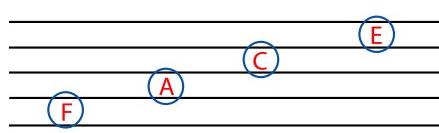
Practice writing your clef symbol on this staff. Write at least eight clef symbols



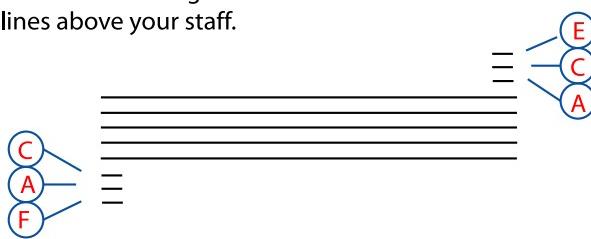
Write the letter names of the lines in your staff:



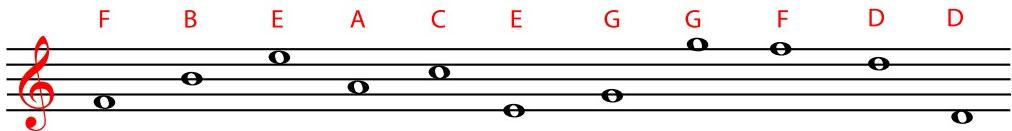
Write the letter names of the spaces:



Write the letter names of the three ledger lines below and the three ledger lines above your staff.



Write your clef symbol at the beginning of this line.
Then write the correct letter name above each note.



Write your clef symbol at the beginning of this line.
Then write a note in the staff for each letter below the staff.

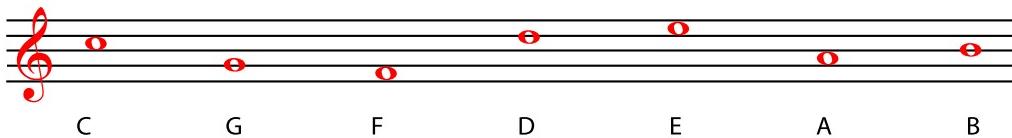


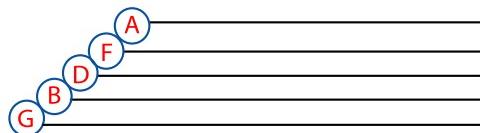
Figure 2.14

Clef Practice

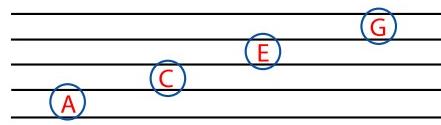
Practice writing your clef symbol on this staff. Write at least eight clef symbols



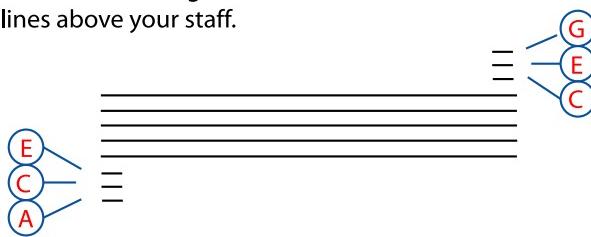
Write the letter names of the lines in your staff:



Write the letter names of the spaces:



Write the letter names of the three ledger lines below and the three ledger lines above your staff.



Write your clef symbol at the beginning of this line.
Then write the correct letter name above each note.

Write your clef symbol at the beginning of this line.
Then write a note in the staff for each letter below the staff.

Figure 2.15

Chapter 3

Introduction to the Piano Keyboard¹

Knowledge of the layout of the piano keyboard is essential to understanding music notation. Figure 1 provides a picture of part of the piano keyboard:



Figure 3.1

(The graphics of the keyboard in Figure 1 and below are modified from Tobias R. – Metoc² , <http://en.wikipedia.org/wiki/File:Klaviatur-3-en.svg>³ [Accessed 01 May 09])

Notice that in Figures 1 and 2 that the piano keyboard has groupings of two and three black keys—twins and triplets.

¹This content is available online at <<http://cnx.org/content/m22849/1.1/>>.

²<http://commons.wikimedia.org/wiki/User:Metoc>

³<http://en.wikipedia.org/wiki/File:Klaviatur-3-en.svg>

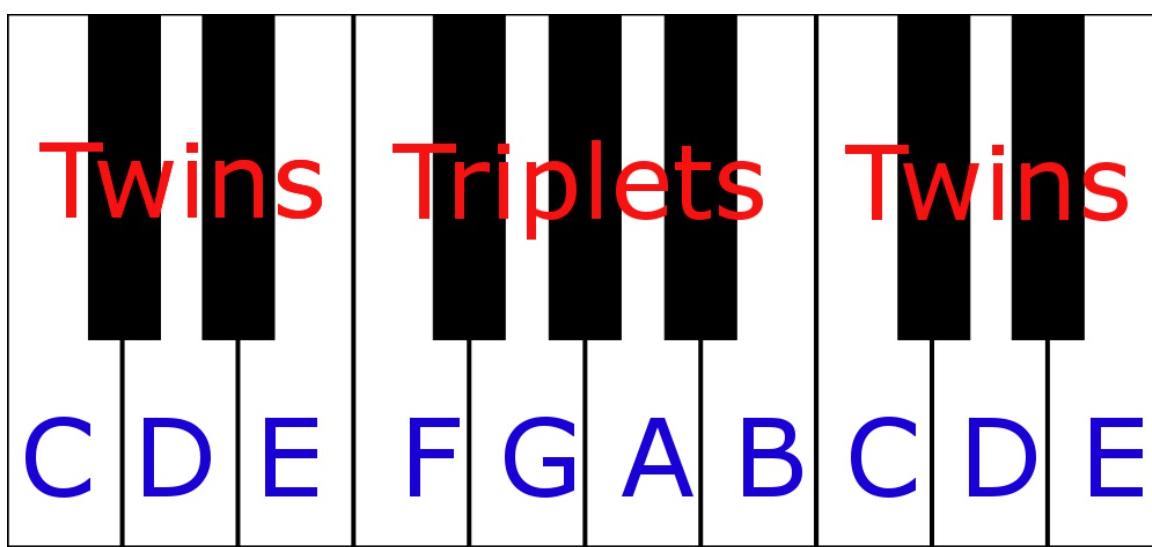


Figure 3.2

The note “C” is always found immediately to the left of the twins of black keys. The musical alphabet (A, B, C, D, E, F, G) repeats throughout the range of the piano keyboard (Figure 1).

The whole steps and half steps are arranged in music notation by referring to the keyboard. Consider these intervals in Figure 3 which are half steps:



Figure 3.3

The music notation in Figure 3 represents these keys on the piano in Figure 4:

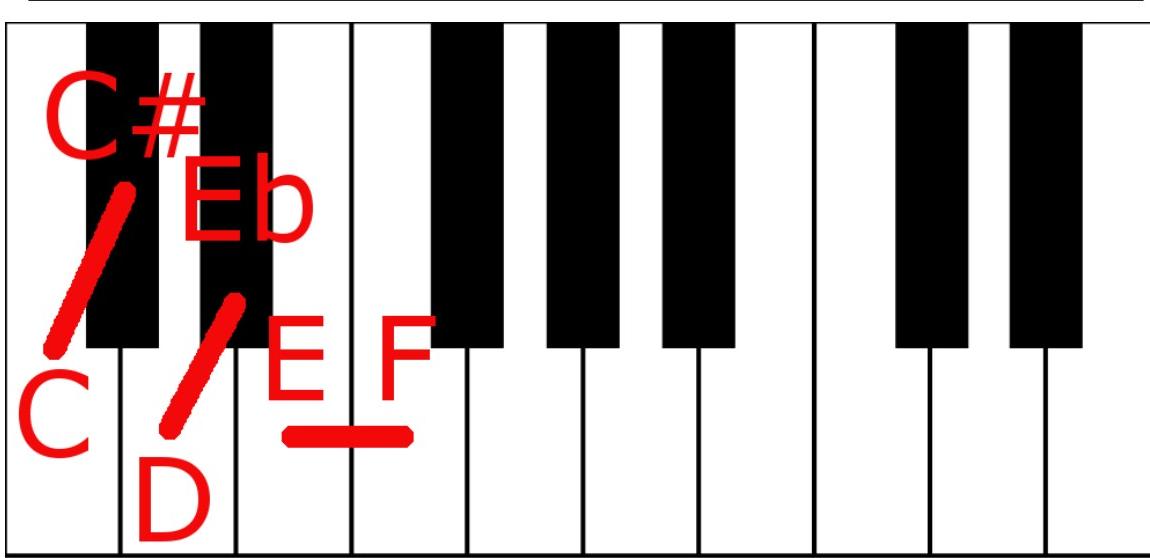


Figure 3.4

Notice that most half step movements are from white to black keys or black to white keys. There are two important exceptions, however, that every music student must memorize. E to F and C to B are half step. These are half step intervals from a white key to a white key.

In Figure 5 the pairs of eighth notes are all whole steps. Whole steps cover the same distance as two half steps moving in the same direction:

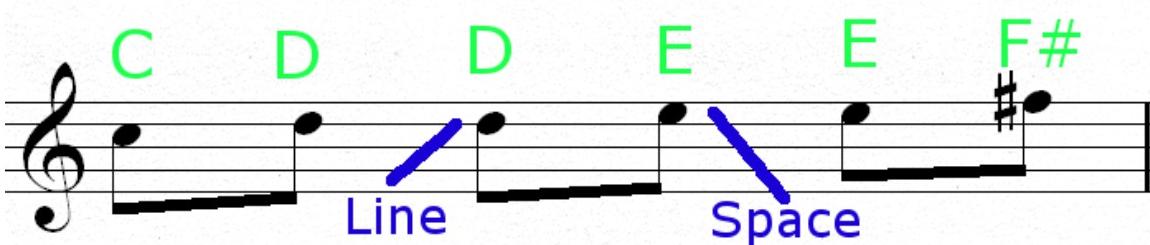


Figure 3.5

Most movements from a line to a space or a space to a line in the music notation result in whole steps. Again, however, the exceptions happen around E and F or B and C.

Movement from C to D on the piano keyboard is a whole step, there is a black key (C# or Db) between the C and D keys (Figure 6):

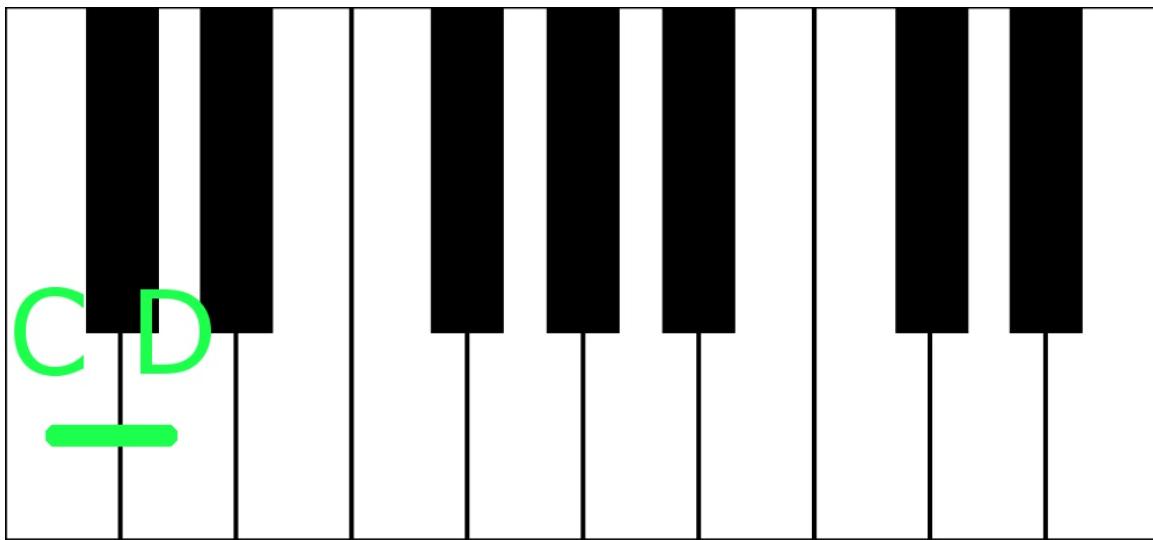


Figure 3.6

Movement from D to E on the piano keyboard is a whole step, there is a black key (D♯ or Eb) between the D and E keys (Figure 7):

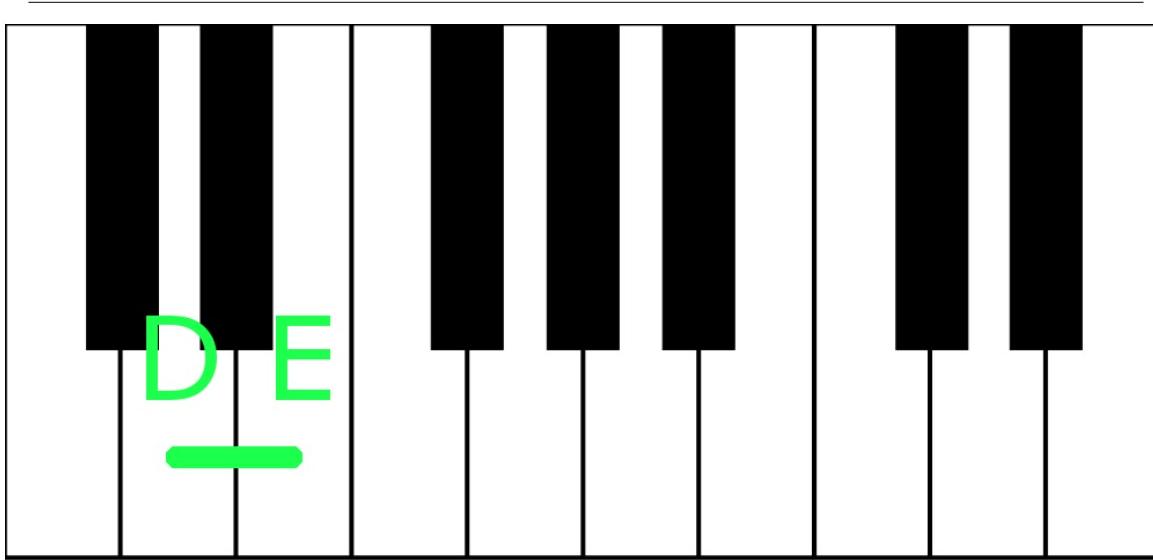


Figure 3.7

Movement from E to F, however, is not a whole step. These are adjacent keys. Instead a whole step is from E to F#.

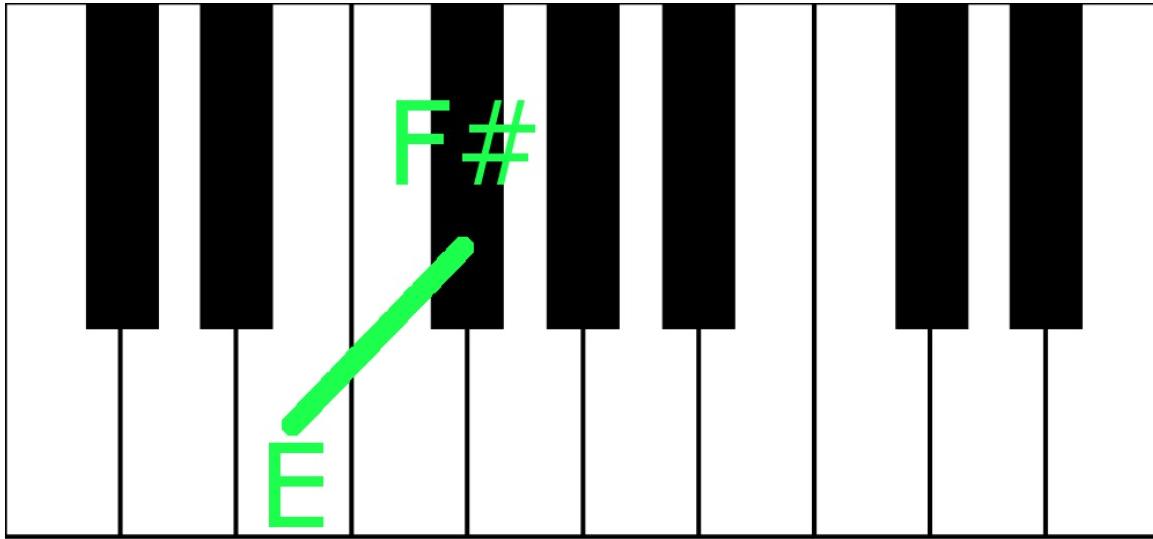


Figure 3.8

Not all keyboards instruments have the same arrangement of white and black notes. For further information on keyboard instruments and an introduction to the piano keyboard see:

Introduction to the piano keyboard (11 minutes) RealPlayer⁴ | Windows Media⁵ | iPod or QuickTime Player⁶ (mp4)

⁴<http://terryewell.com/tu/theory/TheoryIntro.ram>

⁵<http://terryewell.com/tu/theory/TheoryIntro.wmv>

⁶<http://terryewell.com/tu/theory/TheoryIntro.mp4>

Chapter 4

Pitch: Sharp, Flat, and Natural Notes¹

The **pitch** of a note is how high or low it sounds. Pitch depends on the frequency² of the fundamental³ sound wave of the note. The higher the frequency of a sound wave, and the shorter its wavelength⁴, the higher its pitch sounds. But musicians usually don't want to talk about wavelengths and frequencies. Instead, they just give the different pitches different letter names: A, B, C, D, E, F, and G. These seven letters name all the **natural** notes (on a keyboard, that's all the white keys) within one octave. (When you get to the eighth natural note, you start the next octave⁵ on another A.)

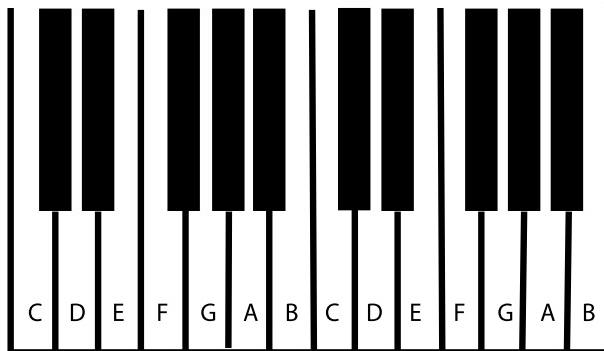


Figure 4.1: The natural notes name the white keys on a keyboard.

But in Western⁶ music there are twelve notes in each octave that are in common use. How do you name the other five notes (on a keyboard, the black keys)?

¹This content is available online at <<http://cnx.org/content/m10943/2.12/>>.

²"Acoustics for Music Theory": Section Wavelength, Frequency, and Pitch <<http://cnx.org/content/m13246/latest/#s2>>

³"Harmonic Series" <<http://cnx.org/content/m11118/latest/#p1c>>

⁴"Acoustics for Music Theory": Section Wavelength, Frequency, and Pitch <<http://cnx.org/content/m13246/latest/#s2>>

⁵"Octaves and the Major-Minor Tonal System" <<http://cnx.org/content/m10862/latest/>>

⁶"What Kind of Music is That?" <<http://cnx.org/content/m11421/latest/>>

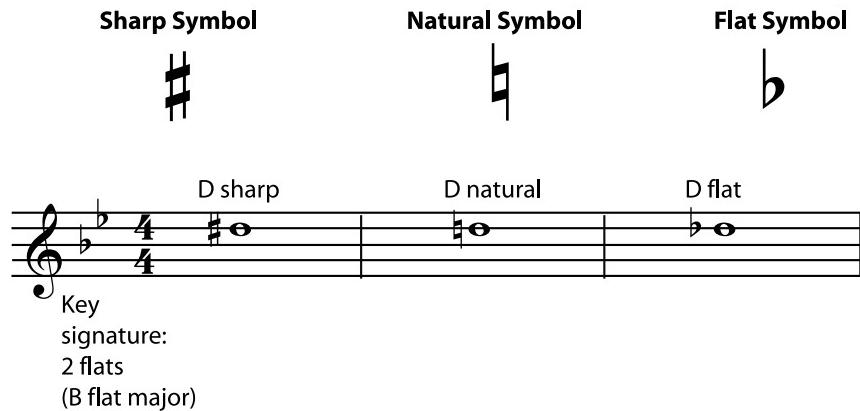


Figure 4.2: Sharp, flat, and natural signs can appear either in the key signature (Chapter 7), or right in front of the note that they change.

A **sharp sign** means "the note that is one half step⁷ higher than the natural note". A **flat sign** means "the note that is one half step lower than the natural note". Some of the natural notes are only one half step apart, but most of them are a whole step⁸ apart. When they are a whole step apart, the note in between them can only be named using a flat or a sharp.

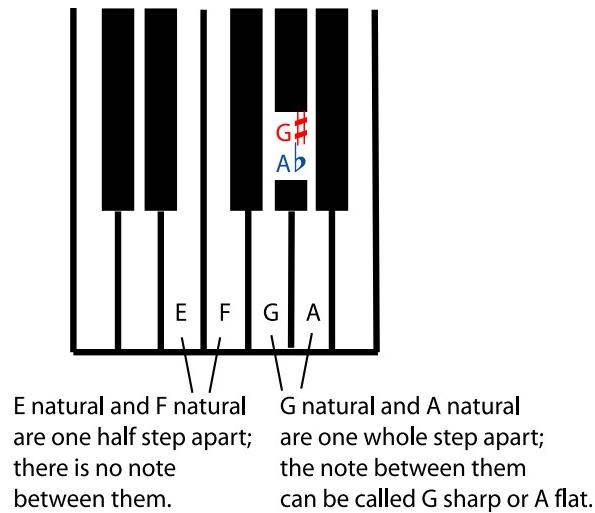


Figure 4.3

⁷"Half Steps and Whole Steps" <<http://cnx.org/content/m10866/latest/>>

⁸"Half Steps and Whole Steps" <<http://cnx.org/content/m10866/latest/>>

Notice that, using flats and sharps, any pitch can be given more than one note name. For example, the G sharp and the A flat are played on the same key on the keyboard; they sound the same. You can also name and write the F natural as "E sharp"; F natural is the note that is a half step higher than E natural, which is the definition of E sharp. Notes that have different names but sound the same are called enharmonic (Chapter 10) notes.

The figure consists of two parts. The top part shows a musical staff with a treble clef and a '4' time signature. It contains four notes: a red 'G sharp' (open circle with a sharp sign), a blue 'A flat' (open circle with a flat sign), another red 'G sharp' (open circle with a sharp sign), and a blue 'F natural' (open circle with a natural sign). Below the staff, the notes are labeled 'G sharp = A flat' and 'E sharp = F natural'. The bottom part shows a vertical piano keyboard with black keys labeled C, D, E, F, G, A, and B from left to right. Colored arrows indicate that the note 'E' is both a red 'E sharp' (with a sharp sign) and a blue 'F natural' (with a natural sign), and that 'G' is both a red 'G sharp' (with a sharp sign) and a blue 'A flat' (with a flat sign).

Figure 4.4: G sharp and A flat sound the same. E sharp and F natural sound the same.

Sharp and flat signs can be used in two ways: they can be part of a key signature (Chapter 7), or they can mark accidentals. For example, if most of the C's in a piece of music are going to be sharp, then a sharp sign is put in the "C" space at the beginning of the staff⁹, in the key signature. If only a few of the C's are going to be sharp, then those C's are marked individually with a sharp sign right in front of them. Pitches that are not in the key signature are called **accidentals**.

The figure shows a musical staff with a treble clef and a 'C' with a sharp sign in the key signature, indicating that all C's are sharp unless otherwise marked. The first note is a red 'C sharp' (open circle with a sharp sign). The second note is a blue 'C sharp' (open circle with a sharp sign) with a sharp sign placed directly in front of it, indicating it is an accidental. The third note is a red '(C sharp)' (open circle with a sharp sign). The fourth note is a blue '(accidental C natural)' (open circle with a natural sign), indicating it is a natural note despite the key signature.

Figure 4.5: When a sharp sign appears in the C space in the key signature, all C's are sharp unless marked as accidentals.

⁹"The Staff" <<http://cnx.org/content/m10880/latest/>>

A note can also be double sharp or double flat. A **double sharp** is two half steps (one whole step) higher than the natural note; a **double flat** is two half steps (a whole step) lower. Triple, quadruple, etc. sharps and flats are rare, but follow the same pattern: every sharp or flat raises or lowers the pitch one more half step.

Using double or triple sharps or flats may seem to be making things more difficult than they need to be. Why not call the note "A natural" instead of "G double sharp"? The answer is that, although A natural and G double sharp are the same pitch, they don't have the same function within a particular chord or a particular key. For musicians who understand some music theory (and that includes most performers, not just composers and music teachers), calling a note "G double sharp" gives important and useful information about how that note functions in the chord¹⁰ and in the progression of the harmony¹¹.

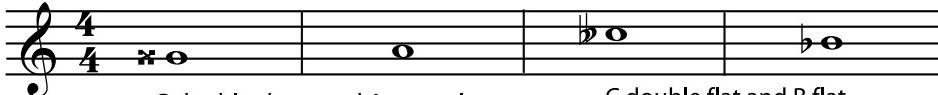
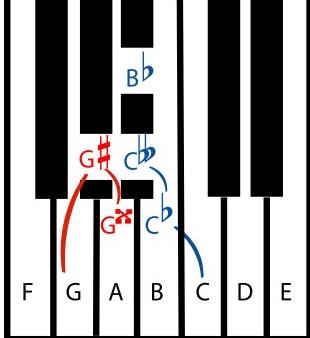
| Double Sharp Symbol | Double Flat Symbol |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
|  |  |
|  |  |
| G double sharp and A natural sound the same. | C double flat and B flat sound the same. |
|  | |

Figure 4.6: Double sharps raise the pitch by two half steps (one whole step). Double flats lower the pitch by two half steps (one whole step).

NOTE: Thanks to everyone who participated in the survey! It was very useful to me, both as a researcher and as an author, to get a better picture of my readers' goals and needs. I hope to begin updating the survey results module¹² in April. I will also soon begin making some of the suggested additions, and emailed comments are still welcome as always.

¹⁰"Harmony": Chords <<http://cnx.org/content/m11654/latest/#l0b>>

¹¹"Beginning Harmonic Analysis" <<http://cnx.org/content/m11643/latest/>>

¹²"A Survey of Users of Connexions Music Modules" <<http://cnx.org/content/m34234/latest/>>

Chapter 5

Chromatic and Diatonic Half Steps¹

Music notation contains two types of half steps: chromatic and diatonic. Chromatic half steps contain the same alphabet letters. For instance, C and C#, Eb and E, and G and G# are all pairs of chromatic half steps. Diatonic half steps also contain half step motions but use adjacent letters in the musical alphabet. E and F, F# and G, and A and Bb are pairs of diatonic half steps.

Study the figure below. Which are chromatic half steps and which are diatonic half steps?

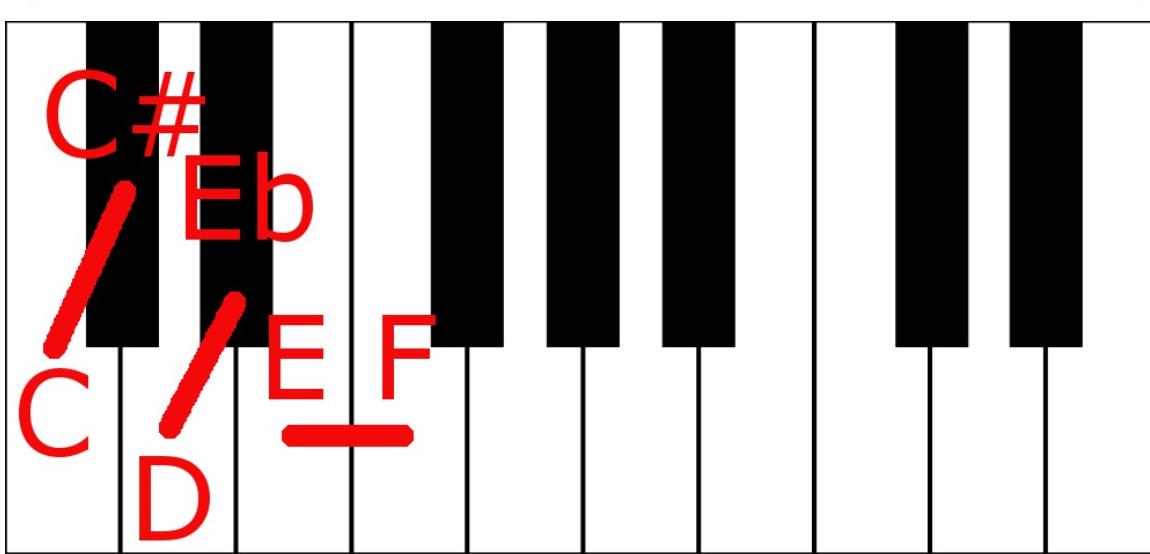


Figure 5.1

ANSWER: C to C# is a chromatic half step. D to Eb and E to F are diatonic half steps.

Here are some examples of chromatic half steps in music notation. Notice that half steps can ascend or descend.

Ascending (C to C#, chromatic half step):

¹This content is available online at <<http://cnx.org/content/m23589/1.1/>>.

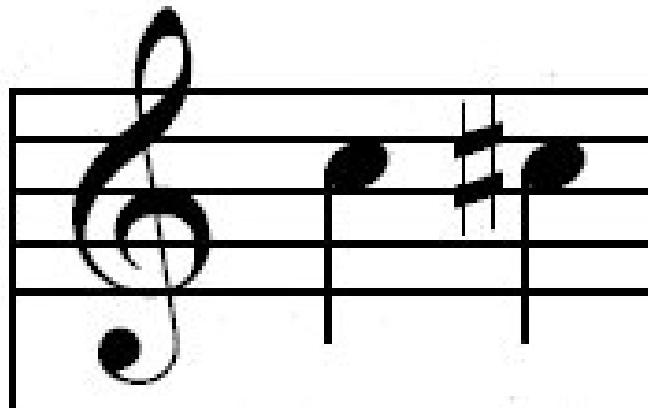


Figure 5.2

Ascending (Bb to B natural, chromatic half step):

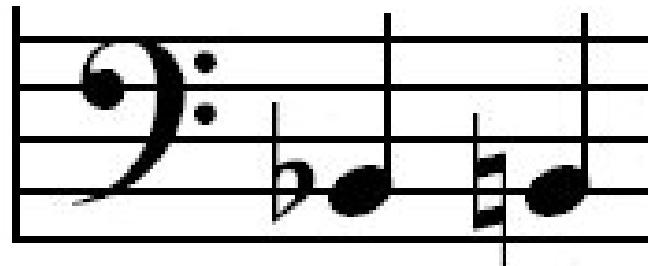


Figure 5.3

Descending (D to Db, chromatic half step):



Figure 5.4

Likewise diatonic half steps can ascend or descend.
Ascending (A# to B, diatonic half step):

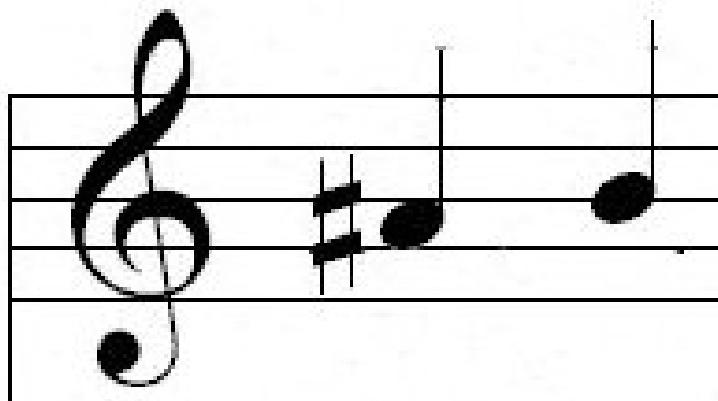


Figure 5.5

Ascending (B to C, diatonic half step):

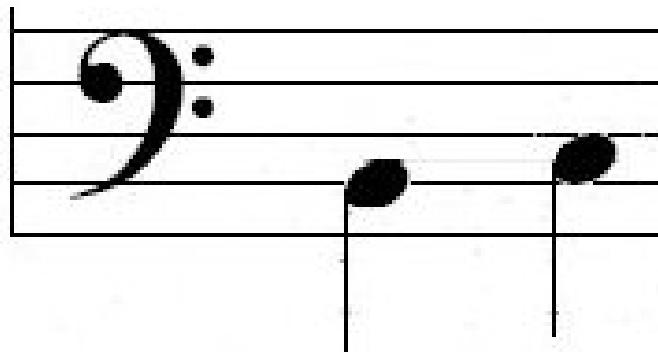


Figure 5.6

Descending (E to D#, diatonic half step):

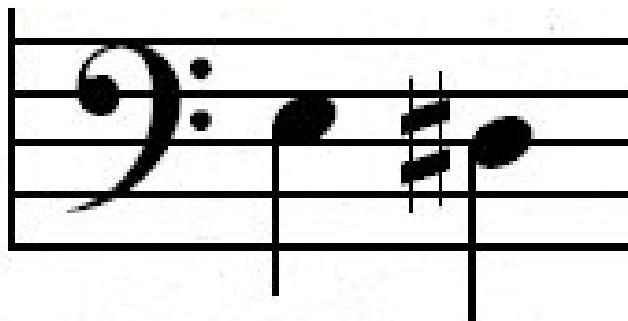


Figure 5.7

Chapter 6

Octave Designations in Music¹

There are many ways in which to designate pitches by text. In this module we introduce a system of identification developed by the Acoustical Society of America. The lowest C on the piano keyboard is C1. The next C above that is designated C2, the C above that is C3, and so forth. The pitches above each C receive the octave designation of the C they are above as given below on the piano keyboard:

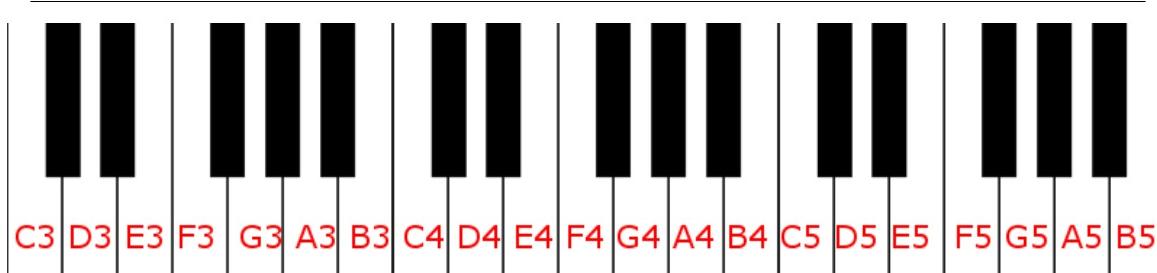


Figure 6.1: The graphics of the keyboard in Figure 1 are modified from Tobias R. – Metoc, <http://en.wikipedia.org/wiki/File:Klaviatur-3-en.svg> (Accessed 01 May 09). It is licensed for public use under the Creative Commons Attribution License.

Here are octave designations with notation:

¹This content is available online at <<http://cnx.org/content/m22936/1.2/>>.



Figure 6.2

For a video on octave designations see:

Octave Designations (2 minutes) [RealPlayer²](http://terryewell.com/tu/theory/OctaveDesignation.ram) | [Windows Media³](http://terryewell.com/tu/theory/OctaveDesignation.wmv) | [iPod or QuickTime Player⁴](#)
[youtube⁵](http://www.youtube.com/watch?v=7Yp-k7vMzwI)

²<http://terryewell.com/tu/theory/OctaveDesignation.ram>

³<http://terryewell.com/tu/theory/OctaveDesignation.wmv>

⁴<http://terryewell.com/tu/theory/OctaveDesignation.mp4>

⁵<http://www.youtube.com/watch?v=7Yp-k7vMzwI>

Chapter 7

Key Signature¹

NOTE: Do key signatures make music more complicated than it needs to be? Is there an easier way? Join the discussion at [Opening Measures²](#).

The key signature comes right after the clef (Chapter 2) symbol on the staff³. It may have either some sharp (Chapter 4) symbols on particular lines or spaces, or some flat (Chapter 4) symbols, again on particular lines or spaces. If there are no flats or sharps listed after the clef symbol, then the key signature is "all notes are natural".

In common notation, clef and key signature are the only symbols that normally appear on every staff. They appear so often because they are such important symbols; they tell you what note is on each line and space of the staff. The clef tells you the letter name of the note (A, B, C, etc.), and the key tells you whether the note is sharp, flat or natural.

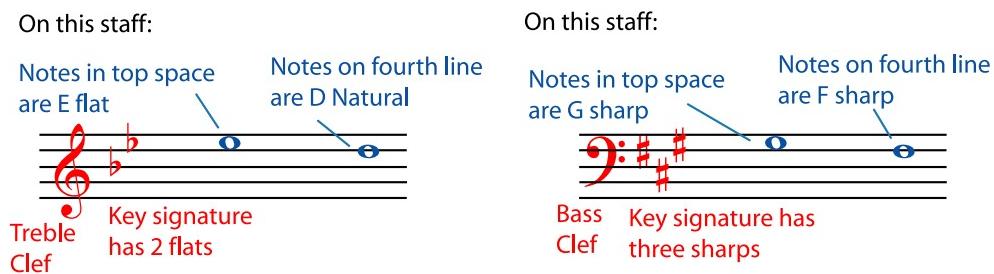


Figure 7.1

The **key signature** is a list of all the sharps and flats in the key (Chapter 8) that the music is in. When a sharp (or flat) appears on a line or space in the key signature, all the notes on that line or space are sharp (or flat), and all other notes with the same letter names in other octaves are also sharp (or flat).

¹This content is available online at <<http://cnx.org/content/m10881/2.15/>>.

²<http://openingmeasures.com/music/22/why-can-t-we-use-something-simpler-than-key-signatures/>

³"The Staff" <<http://cnx.org/content/m10880/latest/>>

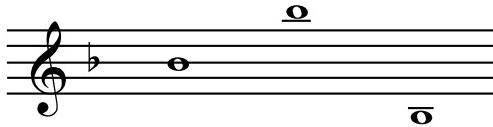


Figure 7.2: This key signature has a flat on the "B" line, so all of these B's are flat.

The sharps or flats always appear in the same order in all key signatures. This is the same order in which they are added as keys get sharper or flatter. For example, if a key (G major or E minor) has only one sharp, it will be F sharp, so F sharp is always the first sharp listed in a sharp key signature. The keys that have two sharps (D major and B minor) have F sharp and C sharp, so C sharp is always the second sharp in a key signature, and so on. **The order of sharps is: F sharp, C sharp, G sharp, D sharp, A sharp, E sharp, B sharp.** **The order of flats is the reverse of the order of sharps: B flat, E flat, A flat, D flat, G flat, C flat, F flat.** So the keys with only one flat (F major and D minor) have a B flat; the keys with two flats (B flat major and G minor) have B flat and E flat; and so on. The order of flats and sharps, like the order of the keys themselves, follows a circle of fifths (Chapter 11).

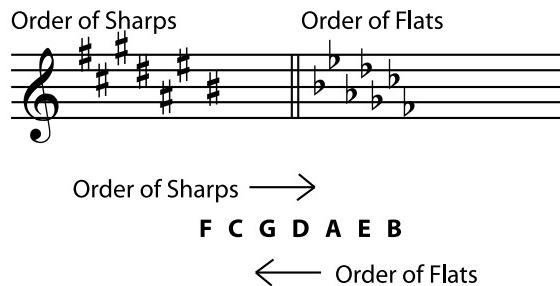


Figure 7.3

If you do not know the name of the key of a piece of music, the key signature can help you find out. Assume for a moment that you are in a major key (Chapter 8). If the key contains sharps, the name of the key is one half step⁴ higher than the last sharp in the key signature. If the key contains flats, the name of the key signature is the name of the second-to-last flat in the key signature.

Example 7.1

Figure 7.4 demonstrates quick ways to name the (major) key simply by looking at the key signature. In flat keys, the second-to-last flat names the key. In sharp keys, the note that names the key is one half step above the final sharp.

⁴"Half Steps and Whole Steps" <<http://cnx.org/content/m10866/latest/>>

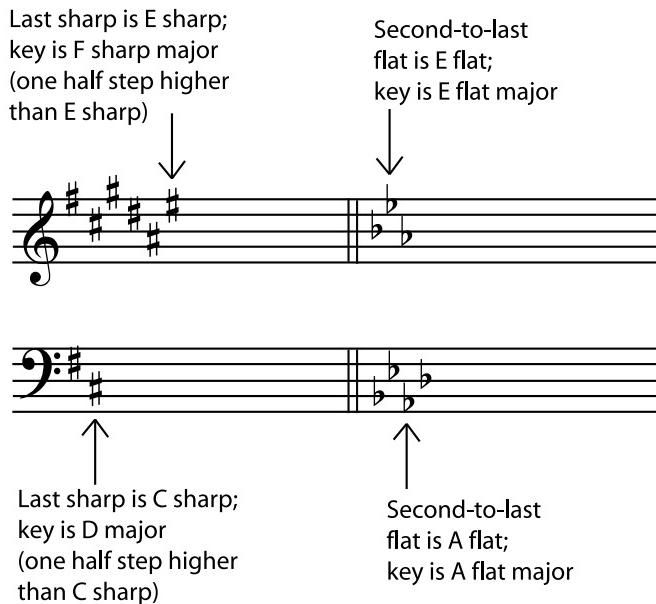


Figure 7.4

The only major keys that these rules do not work for are C major (no sharps or flats) and F major (one flat). It is easiest just to memorize the key signatures for these two very common keys. If you want a rule that also works for the key of F major, remember that the second-to-last flat is always a perfect fourth⁵ higher than (or a perfect fifth lower than) the final flat. So you can also say that the name of the key signature is a perfect fourth lower than the name of the final flat.

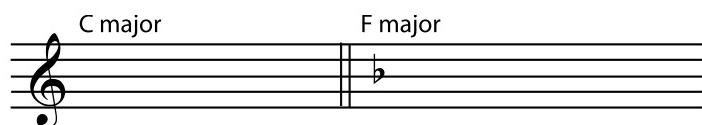


Figure 7.5: The key of C major has no sharps or flats. F major has one flat.

If the music is in a minor key, it will be in the relative minor⁶ of the major key for that key signature. You may be able to tell just from listening (see Major Keys and Scales (Chapter 8)) whether the music is in a major or minor key. If not, the best clue is to look at the final chord⁷. That chord (and often the final note of the melody, also) will usually name the key.

Exercise 7.1

(Solution on p. 39.)

Write the key signatures asked for in Figure 7.6 and name the major keys that they represent.

⁵"Interval" <<http://cnx.org/content/m10867/latest/#p21b>>⁶"Minor Keys and Scales": Section Relative Minor and Major Keys <<http://cnx.org/content/m10856/latest/#s3>>⁷"Harmony": Chords <<http://cnx.org/content/m11654/latest/#l0b>>

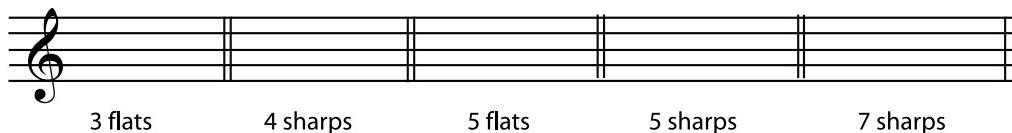


Figure 7.6

NOTE: Thanks to everyone who participated in the survey! It was very useful to me, both as a researcher and as an author, to get a better picture of my readers' goals and needs. I hope to begin updating the survey results module⁸ in April. I will also soon begin making some of the suggested additions, and emailed comments are still welcome as always.

⁸"A Survey of Users of Connexions Music Modules" <<http://cnx.org/content/m34234/latest/>>

Solutions to Exercises in Chapter 7

Solution to Exercise 7.1 (p. 37)



Figure 7.7

Chapter 8

Major Keys and Scales¹

The simple, sing-along, nursery rhymes and folk songs we learn as children; the "catchy" tunes used in advertising jingles; the cheerful, toe-tapping pop and rock we dance to; the uplifting sounds of a symphony: most music in a major key has a bright sound that people often describe as cheerful, inspiring, exciting, or just plain fun.

How are these moods produced? Music in a particular **key** tends to use only some of the many possible notes available; these notes are listed in the **scale** associated with that key. In major keys, the notes of the scale are often used to build "bright"-sounding major chords². They also give a strong feeling of having a tonal center (p. 42), a note or chord that feels like "home", or "the resting place", in that key. The "bright"-sounding major chords and the strong feeling of tonality are what give major keys their happy, pleasant moods. This contrasts with the moods usually suggested by music that uses minor³ keys, scales, and chords. Although it also has a strong tonal center (the Western⁴ tradition of tonal harmony⁵ is based on major and minor keys and scales), music in a minor key is more likely to sound sad, ominous, or mysterious. In fact, most musicians, and even many non-musicians, can distinguish major and minor keys just by listening to the music.

Exercise 8.1

(*Solution on p. 45.*)

Listen to these excerpts. Three are in a major key and two in a minor key. Can you tell which is which simply by listening?

- 1.⁶
- 2.⁷
- 3.⁸
- 4.⁹
- 5.¹⁰

NOTE: If you must determine whether a piece of music is major or minor, and cannot tell just by listening, you may have to do some simple harmonic analysis¹¹ in order to decide.

¹This content is available online at <<http://cnx.org/content/m10851/2.25/>>.

²"Naming Triads" <<http://cnx.org/content/m10890/latest/>>

³"Minor Keys and Scales" <<http://cnx.org/content/m10856/latest/>>

⁴"What Kind of Music is That?" <<http://cnx.org/content/m11421/latest/>>

⁵"Harmony" <<http://cnx.org/content/m11654/latest/>>

⁶See the file at <<http://cnx.org/content/m10851/latest/Guitar1.mp3>>

⁷See the file at <<http://cnx.org/content/m10851/latest/Guitar2.mp3>>

⁸See the file at <<http://cnx.org/content/m10851/latest/Guitar3.mp3>>

⁹See the file at <<http://cnx.org/content/m10851/latest/Tanz.mp3>>

¹⁰See the file at <<http://cnx.org/content/m10851/latest/Greensleeves.mp3>>

¹¹"Beginning Harmonic Analysis": Section Minor Keys <<http://cnx.org/content/m11643/latest/#s6>>

8.1 Tonal Center

A scale starts with the note that names the key. This note is the **tonal center** of that key, the note where music in that key feels "at rest". It is also called the **tonic**, and it's the "do" in "do-re-mi". For example, music in the key of A major almost always ends on an A major chord, the chord¹² built on the note A. It often also begins on that chord, returns to that chord often, and features a melody and a bass line that also return to the note A often enough that listeners will know where the tonal center of the music is, even if they don't realize that they know it. (For more information about the tonic chord and its relationship to other chords in a key, please see Beginning Harmonic Analysis¹³.)

Example 8.1

Listen to these examples. Can you hear that they do not feel "done" until the final tonic is played?

- Example A¹⁴
- Example B¹⁵

8.2 Major Scales

To find the rest of the notes in a major key, start at the tonic and go up following this pattern: **whole step, whole step, half step, whole step, whole step, whole step, half step**. This will take you to the tonic one octave higher than where you began, and includes all the notes in the key in that octave.

Example 8.2

These major scales all follow the same pattern of whole steps and half steps. They have different sets of notes because the pattern starts on different notes.

Three Major Scales

Three Major Scales

Whole Step Whole Step Half Step Whole Step Whole Step Whole Step Half Step

W W H W W W H

Figure 8.1: All major scales have the same pattern of half steps and whole steps, beginning on the note that names the scale - the tonic (p. 42).

¹²"Harmony": Chords <<http://cnx.org/content/m11654/latest/#10b>>

¹³"Beginning Harmonic Analysis" <<http://cnx.org/content/m11643/latest/>>

¹⁴See the file at <<http://cnx.org/content/m10851/latest/Tonal1.MID>>

¹⁵See the file at <<http://cnx.org/content/m10851/latest/tonic2.MID>>

Listen to the difference between the C major¹⁶, D major¹⁷, and B flat major¹⁸ scales.

Exercise 8.2

(*Solution on p. 45.*)

For each note below, write a major scale, one octave, ascending (going up), beginning on that note. If you're not sure whether a note should be written as a flat, sharp, or natural, remember that you won't ever skip a line or space, or write two notes of the scale on the same line or space. If you need help keeping track of half steps, use a keyboard, a picture of a keyboard¹⁹, a written chromatic scale²⁰, or the chromatic scale fingerings for your instrument. If you need more information about half steps and whole steps, see Half Steps and Whole Steps²¹.

If you need staff paper for this exercise, you can print out this staff paper²² PDF file.

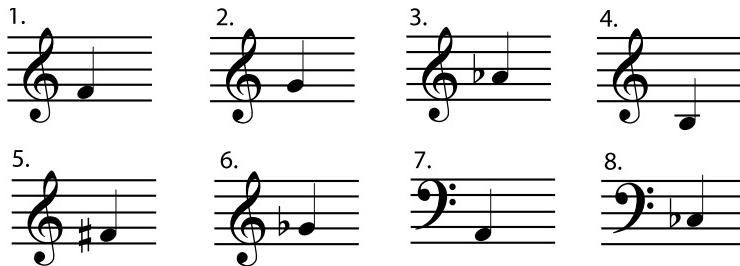


Figure 8.2

In the examples above, the sharps and flats are written next to the notes. In common notation, the sharps and flats **that belong in the key** will be written at the beginning of each staff, in the **key signature**. For more practice identifying keys and writing key signatures, please see Key Signature (Chapter 7). For more information about how keys are related to each other, please see The Circle of Fifths (Chapter 11).

NOTE: Do key signatures make music more complicated than it needs to be? Is there an easier way? Join the discussion at Opening Measures²³.

8.3 Music in Different Major Keys

What difference does key make? Since the major scales all follow the same pattern, they all sound very much alike. Here is the tune "Row, Row, Row Your Boat", written in G major and also in D major.

¹⁶See the file at <<http://cnx.org/content/m10851/latest/tonmjC.mp3>>

¹⁷See the file at <<http://cnx.org/content/m10851/latest/tonmjD.mp3>>

¹⁸See the file at <<http://cnx.org/content/m10851/latest/tonmjBflat.mp3>>

¹⁹"Octaves and the Major-Minor Tonal System", Figure 6: Keyboard <<http://cnx.org/content/m10862/latest/#fig3a>>

²⁰"Half Steps and Whole Steps" <<http://cnx.org/content/m10866/latest/#p0bb>>

²¹"Half Steps and Whole Steps" <<http://cnx.org/content/m10866/latest/>>

²²See the file at <<http://cnx.org/content/m10851/latest/staffpaper1.pdf>>

²³<http://openingmeasures.com/music/22/why-can-t-we-use-something-simpler-than-key-signatures/>



Figure 8.3: The same tune looks very different when written in two different major keys. (a) In G Major (b) In D Major

Listen to this tune in G major²⁴ and in D major²⁵. The music may look quite different, but the only difference when you listen is that one sounds higher than the other. So why bother with different keys at all? Before equal temperament²⁶ became the standard tuning system, major keys sounded more different from each other than they do now. Even now, there are subtle differences between the sound of a piece in one key or another, mostly because of differences in the timbre²⁷ of various notes on the instruments or voices involved. But today the most common reason to choose a particular key is simply that the music is easiest to sing or play in that key. (Please see Transposition²⁸ for more about choosing keys.)

²⁴See the file at <<http://cnx.org/content/m10851/latest/RowBoatG.mid>>

²⁵See the file at <<http://cnx.org/content/m10851/latest/RowBoatD.mid>>

²⁶"Tuning Systems": Section Equal Temperament <<http://cnx.org/content/m11639/latest/#s22>>

²⁷"Timbre: The Color of Music" <<http://cnx.org/content/m11059/latest/>>

²⁸"Transposition: Changing Keys" <<http://cnx.org/content/m10668/latest/>>

Solutions to Exercises in Chapter 8

Solution to Exercise 8.1 (p. 41)

1. Major
2. Major
3. Minor
4. Major
5. Minor

Solution to Exercise 8.2 (p. 43)

The figure consists of eight musical staves, each with a treble clef and a key signature. The staves are numbered 1 through 8.

- 1. Key signature: No sharps or flats. Notes: A, B, C, D, E, F, G.
- 2. Key signature: One sharp (F#). Notes: A, B, C, D, E, F#, G.
- 3. Key signature: Two sharps (C# and G#). Notes: B, C#, D, E, F#, G#, A.
- 4. Key signature: Three sharps (G#, C#, F#). Notes: E, F#, G#, A, B, C#, D.
- 5. Key signature: Three sharps (G#, C#, F#). Notes: E, F#, G#, A, B, C#, D.
- 6. Key signature: Three sharps (G#, C#, F#). Notes: B, C#, D, E, F#, G#, A.
- 7. Key signature: One sharp (F#). Notes: A, B, C, D, E, F#, G.
- 8. Key signature: Two sharps (C# and G#). Notes: B, C#, D, E, F#, G#, A.

Figure 8.4

Notice that although they look completely different, the scales of F sharp major and G flat major (numbers 5 and 6) sound exactly the same when played, on a piano as shown in Figure 8.5 (Enharmonic Scales), or on any other instrument using equal temperament²⁹ tuning. If this surprises you, please read more about enharmonic (Chapter 10) scales.

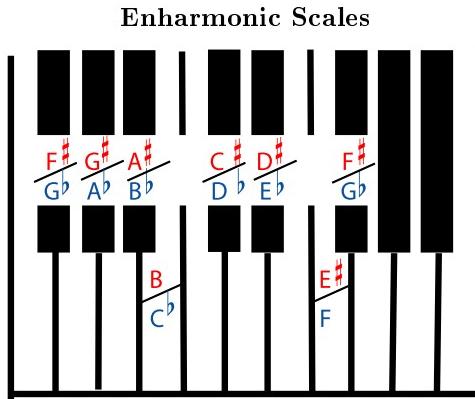


Figure 8.5: Using this figure of a keyboard, or the fingerings from your own instrument, notice that the notes for the F sharp major scale and the G flat major scale in Figure 8.4, although spelled differently, will sound the same.

²⁹"Tuning Systems": Section Equal Temperament <<http://cnx.org/content/m11639/latest/#s22>>

Chapter 9

Scale Degrees of the Diatonic Scale¹

Scale Degrees

In music we discuss the seven steps of diatonic scales in two different ways. Sometimes we reference the scale steps with numbers:

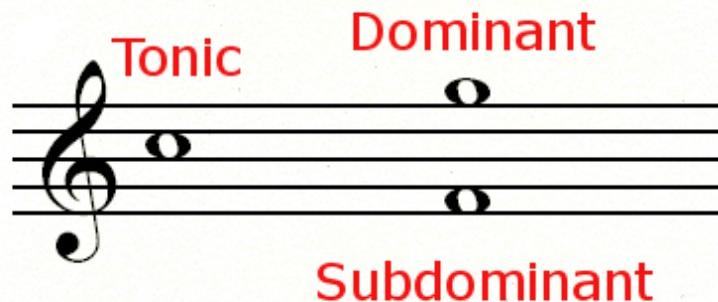


Figure 9.1

In this C major scale, for instance, scale degree 4 is an F. The 8th scale degree is the same note name as the 1st scale degree.

Secondly, each scale degree also has a unique name, one that will be often applied to harmonies built on the scale degree. Before we introduce all the scale degrees in the order they appear in the diatonic scale, let's first explain how the scale degrees are related.

¹This content is available online at <<http://cnx.org/content/m24691/1.1/>>.

**Figure 9.2**

The note name of each scale (here C major) or the first scale degree is called the “tonic.” This is the central note in the tonal scale or key. The next most important note is termed “dominant” for the large role (dominant role) it plays in tonal compositions. Many compositions end with chords built upon the dominant and tonic of the key. Notice that the dominant is located on the 5th scale degree—on the fifth alphabet letter of the scale:

**Figure 9.3**

The subdominant (lower dominant) mirrors the dominant. It is below the tonic by five scale steps. “Subdominant” is below the tonic just as “submarines” are below the surface of the ocean. Count out the five steps so you verify that the subdominant is five steps below the tonic. (C, B, A, G, F)

The mediant and submediant are also arranged in mirror images around the tonic:

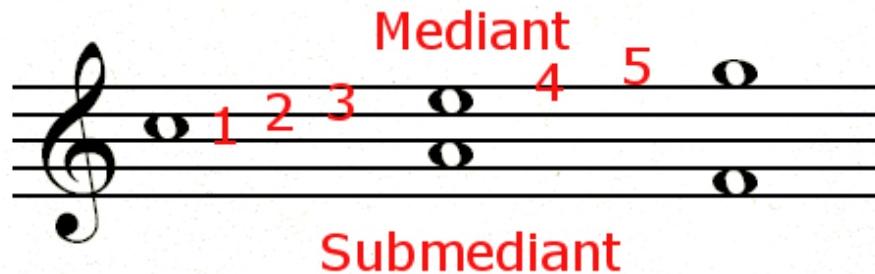


Figure 9.4

"Mediant" means middle. Thus, the mediant is in the middle of the tonic and dominant, on the 3rd scale step. The submediant is in the middle of the tonic and subdominant.

The last two scale degrees, 2 and 7 are arranged around the tonic. The "supertonic" is above the tonic on the second scale degree. The "leading tone" is an important scale step that leads to the tonic both melodically and harmonically. You will learn more about this important scale step in your later studies.

Here are the names of the scale degrees on the C major scale:



Figure 9.5

Chapter 10

Enharmonic Spelling¹

NOTE: Are you really free to use this online resource? Join the discussion at [Opening Measures²](#).

10.1 Enharmonic Notes

In common notation³, any note can be sharp, flat, or natural (Chapter 4). A sharp symbol raises the pitch (Chapter 4) (of a natural note) by one half step⁴; a flat symbol lowers it by one half step.

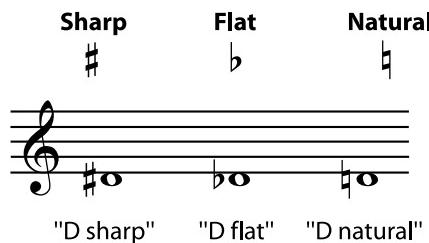


Figure 10.1

Why do we bother with these symbols? There are twelve pitches available within any octave⁵. We could give each of those twelve pitches its own name (A, B, C, D, E, F, G, H, I, J, K, and L) and its own line or space on a staff. But that would actually be fairly inefficient, because most music is in a particular key (Chapter 8). And music that is in a major (Chapter 8) or minor⁶ key will tend to use only seven of those twelve notes. So music is easier to read if it has only lines, spaces, and notes for the seven pitches it is (mostly) going to use, plus a way to write the occasional notes that are not in the key.

This is basically what common notation does. There are only seven note names (A, B, C, D, E, F, G), and each line or space on a staff⁷ will correspond with one of those note names. To get all twelve pitches

¹This content is available online at <<http://cnx.org/content/m11641/1.13/>>.

²<http://openingmeasures.com/open-education/40/are-the-education-resources-at-Connexions-really-free/>

³"The Staff" <<http://cnx.org/content/m10880/latest/>>

⁴"Half Steps and Whole Steps" <<http://cnx.org/content/m10866/latest/>>

⁵"Octaves and the Major-Minor Tonal System" <<http://cnx.org/content/m10862/latest/>>

⁶"Minor Keys and Scales" <<http://cnx.org/content/m10856/latest/>>

⁷"The Staff" <<http://cnx.org/content/m10880/latest/>>

using only the seven note names, we allow any of these notes to be sharp, flat, or natural. Look (Figure 10.2) at the notes on a keyboard.

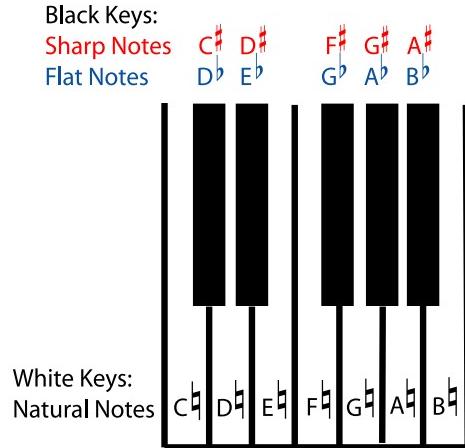


Figure 10.2: Seven of the twelve possible notes in each octave⁸ are "natural" notes.

Because most of the natural notes are two half steps apart, there are plenty of pitches that you can only get by naming them with either a flat or a sharp (on the keyboard, the "black key" notes). For example, the note in between D natural and E natural can be named either D sharp or E flat. These two names look very different on the staff, but they are going to sound exactly the same, since you play both of them by pressing the same black key on the piano.



Figure 10.3: D sharp and E flat look very different when written in common notation, but they sound exactly the same when played on a piano.

This is an example of **enharmonic spelling**. Two notes are **enharmonic** if they sound the same on a piano but are named and written differently.

Exercise 10.1

(*Solution on p. 57.*)

Name the other enharmonic notes that are listed above the black keys on the keyboard in Figure 10.2. Write them on a treble clef staff. If you need staff paper, you can print out this PDF file⁹

⁸"Octaves and the Major-Minor Tonal System" <<http://cnx.org/content/m10862/latest/>>

⁹See the file at <<http://cnx.org/content/m11641/latest/staffpaper1.pdf>>

But these are not the only possible enharmonic notes. Any note can be flat or sharp, so you can have, for example, an E sharp. Looking at the keyboard (Figure 10.2) and remembering that the definition of sharp is "one half step higher than natural", you can see that an E sharp must sound the same as an F natural. Why would you choose to call the note E sharp instead of F natural? Even though they sound the same, E sharp and F natural, as they are actually used in music, are different notes. (They may, in some circumstances, also sound different; see below (Section 10.4: Enharmonic Spellings and Equal Temperament).) Not only will they look different when written on a staff, but they will have different functions within a key and different relationships with the other notes of a piece of music. So a composer may very well prefer to write an E sharp, because that makes the note's place in the harmonies of a piece more clear to the performer. (Please see Triads¹⁰, Beyond Triads¹¹, and Harmonic Analysis¹² for more on how individual notes fit into chords and harmonic progressions.)

In fact, this need (to make each note's place in the harmony very clear) is so important that double sharps and double flats have been invented to help do it. A double sharp is two half steps (one whole step¹³) higher than the natural note. A double flat is two half steps lower than the natural note. Double sharps and flats are fairly rare, and triple and quadruple flats even rarer, but all are allowed.

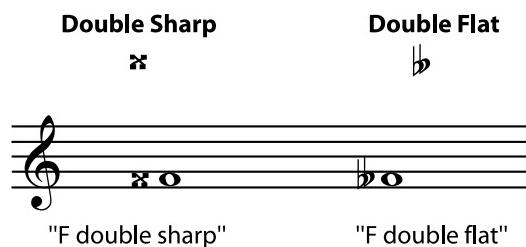


Figure 10.4

Exercise 10.2

(*Solution on p. 57.*)

Give at least one enharmonic spelling for the following notes. Try to give more than one. (Look at the keyboard (Figure 10.2) again if you need to.)

1. E natural
2. B natural
3. C natural
4. G natural
5. A natural

10.2 Enharmonic Keys and Scales

Keys and scales can also be enharmonic. Major keys, for example, always follow the same pattern of half steps and whole steps. (See Major Keys and Scales (Chapter 8). Minor keys also all follow the same pattern, different from the major scale pattern; see Minor Keys¹⁴.) So whether you start a major scale on an E flat,

¹⁰"Triads" <<http://cnx.org/content/m10877/latest/>>

¹¹"Beyond Triads: Naming Other Chords" <<http://cnx.org/content/m11995/latest/>>

¹²"Beginning Harmonic Analysis" <<http://cnx.org/content/m11643/latest/>>

¹³"Half Steps and Whole Steps" <<http://cnx.org/content/m10866/latest/>>

¹⁴"Minor Keys and Scales" <<http://cnx.org/content/m10856/latest/>>

or start it on a D sharp, you will be following the same pattern, playing the same piano keys as you go up the scale. But the notes of the two scales will have different names, the scales will look very different when written, and musicians may think of them as being different. For example, most instrumentalists would find it easier to play in E flat than in D sharp. In some cases, an E flat major scale may even sound slightly different from a D sharp major scale. (See below (Section 10.4: Enharmonic Spellings and Equal Temperament).)



Figure 10.5: The E flat major and D sharp major scales sound the same on the piano, although they look very different. If this surprises you, look again at the piano keyboard (Figure 10.2) and find the notes that you would play for each scale.

Since the scales are the same, D sharp major and E flat major are also **enharmonic keys**. Again, their key signatures will look very different, but music in D sharp will not be any higher or lower than music in E flat.

Enharmonic Keys

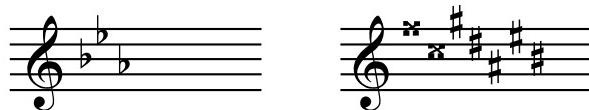


Figure 10.6: The key signatures for E flat and D sharp look very different, but would sound the same on a keyboard.

Exercise 10.3

(*Solution on p. 57.*)

Give an enharmonic name and key signature for the keys given in Figure 10.7. (If you are not well-versed in key signatures (Chapter 7) yet, pick the easiest enharmonic spelling for the key name, and the easiest enharmonic spelling for every note in the key signature. Writing out the scales may help, too.)

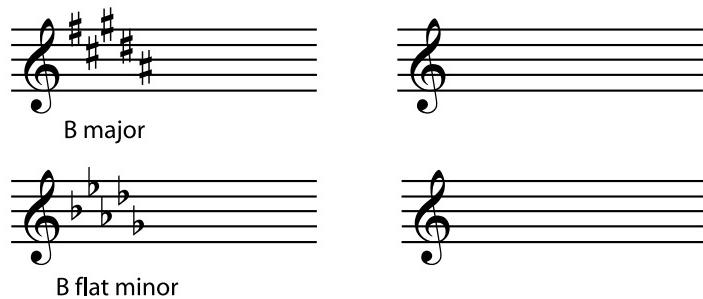


Figure 10.7

10.3 Enharmonic Intervals and Chords

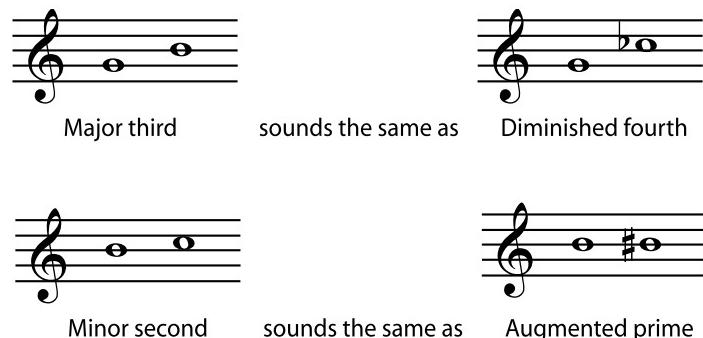


Figure 10.8

Chords¹⁵ and intervals¹⁶ also can have enharmonic spellings. Again, it is important to name a chord or interval as it has been spelled, in order to understand how it fits into the rest of the music. A C sharp major chord means something different in the key of D than a D flat major chord does. And an interval of a diminished fourth means something different than an interval of a major third, even though they would be played using the same keys on a piano. (For practice naming intervals, see Interval¹⁷. For practice naming chords, see Naming Triads¹⁸ and Beyond Triads¹⁹. For an introduction to how chords function in a harmony, see Beginning Harmonic Analysis²⁰.)

¹⁵"Harmony": Chords <<http://cnx.org/content/m11654/latest/#l0b>>

¹⁶"Interval" <<http://cnx.org/content/m10867/latest/>>

¹⁷"Interval" <<http://cnx.org/content/m10867/latest/>>

¹⁸"Naming Triads" <<http://cnx.org/content/m10890/latest/>>

¹⁹"Beyond Triads: Naming Other Chords" <<http://cnx.org/content/m11995/latest/>>

²⁰"Beginning Harmonic Analysis" <<http://cnx.org/content/m11643/latest/>>

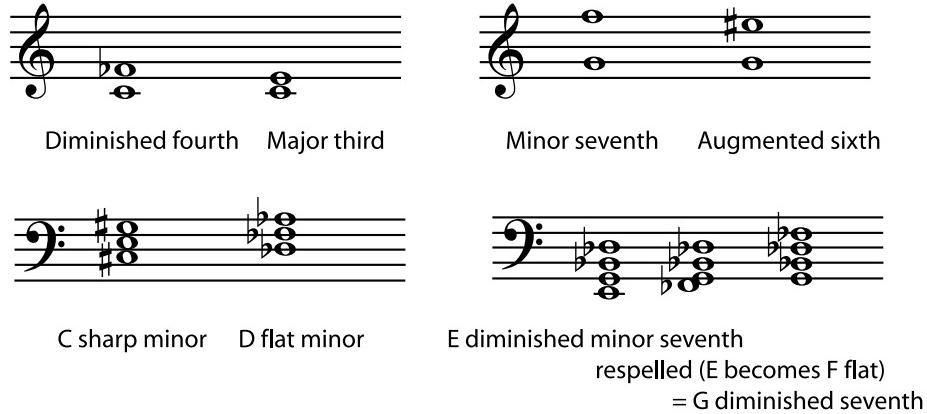


Figure 10.9

10.4 Enharmonic Spellings and Equal Temperament

All of the above discussion assumes that all notes are tuned in equal temperament²¹. Equal temperament has become the "official" tuning system for Western music²². It is easy to use in pianos and other instruments that are difficult to retune (organ, harp, and xylophone, to name just a few), precisely because enharmonic notes sound exactly the same. But voices and instruments that can fine-tune quickly (for example violins, clarinets, and trombones) often move away from equal temperament. They sometimes drift, consciously or unconsciously, towards just intonation²³, which is more closely based on the harmonic series²⁴. When this happens, enharmonically spelled notes, scales, intervals, and chords, may not only be theoretically different. They may also actually be slightly different pitches. The differences between, say, a D sharp and an E flat, when this happens, are very small, but may be large enough to be noticeable. Many Non-western music traditions²⁵ also do not use equal temperament. **Sharps and flats used to notate music in these traditions should not be assumed to mean a change in pitch equal to an equal-temperament half-step.** For definitions and discussions of equal temperament, just intonation, and other tuning systems, please see Tuning Systems²⁶.

²¹"Tuning Systems": Section Equal Temperament <<http://cnx.org/content/m11639/latest/#s22>>

²²"What Kind of Music is That?" <<http://cnx.org/content/m11421/latest/>>

²³"Tuning Systems" <<http://cnx.org/content/m11639/latest/#p12a>>

²⁴"Harmonic Series I: Timbre and Octaves" <<http://cnx.org/content/m13682/latest/>>

²⁵"What Kind of Music is That?" <<http://cnx.org/content/m11421/latest/>>

²⁶"Tuning Systems" <<http://cnx.org/content/m11639/latest/>>

Solutions to Exercises in Chapter 10

Solution to Exercise 10.1 (p. 52)

- C sharp and D flat
- F sharp and G flat
- G sharp and A flat
- A sharp and B flat



Figure 10.10

Solution to Exercise 10.2 (p. 53)

1. F flat; D double sharp
2. C flat; A double sharp
3. B sharp; D double flat
4. F double sharp; A double flat
5. G double sharp; B double flat

Solution to Exercise 10.3 (p. 54)

B major C flat major
B flat minor A sharp minor

Figure 10.11

Chapter 11

The Circle of Fifths¹

NOTE: Are you really free to use this online resource? Join the discussion at Opening Measures².

11.1 Related Keys

The circle of fifths is a way to arrange keys to show how closely they are related to each other.

¹This content is available online at <<http://cnx.org/content/m10865/2.15/>>.

²<http://openingmeasures.com/open-education/40/are-the-education-resources-at-Connexions-really-free/>

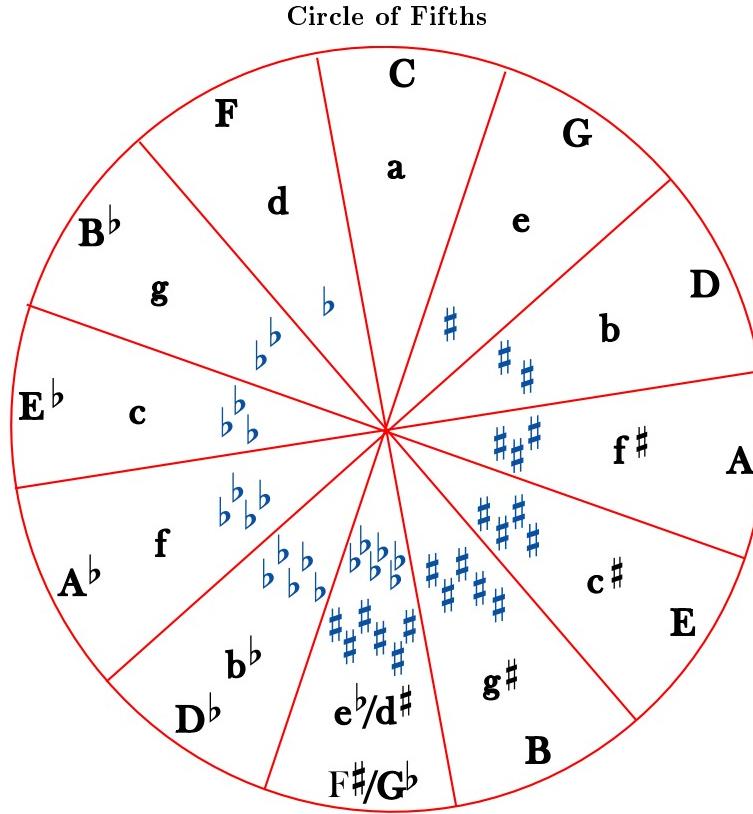


Figure 11.1: The major key for each key signature is shown as a capital letter; the minor key as a small letter. In theory, one could continue around the circle adding flats or sharps (so that B major is also C flat major, with seven flats, E major is also F flat major, with 6 flats and a double flat, and so on), but in practice such key signatures are very rare.

Keys are not considered closely related to each other if they are near each other in the chromatic scale³ (or on a keyboard). What makes two keys "closely related" is having similar key signatures (Chapter 7). So the most closely related key to C major, for example, is A minor, since they have the same key signature (no sharps and no flats). This puts them in the same "slice" of the circle. The next most closely related keys to C major would be G major (or E minor), with one sharp, and F major (or D minor), with only one flat. The keys that are most distant from C major, with six sharps or six flats, are on the opposite side of the circle.

The circle of fifths gets its name from the fact that as you go from one section of the circle to the next, you are going up or down by an interval⁴ of a perfect fifth⁵. If you go up a perfect fifth (clockwise in the circle), you get the key that has one more sharp or one less flat; if you go down a perfect fifth (counterclockwise), you get the key that has one more flat or one less sharp. Since going down by a perfect fifth is the same as going up by a perfect fourth⁶, the counterclockwise direction is sometimes referred to as a "circle of fourths".

³"Half Steps and Whole Steps" <<http://cnx.org/content/m10866/latest/#p0bb>>

⁴"Interval" <<http://cnx.org/content/m10867/latest/>>

⁵"Interval": Section Perfect Intervals <<http://cnx.org/content/m10867/latest/#s21>>

⁶"Interval" <<http://cnx.org/content/m10867/latest/#p21b>>

(Please review inverted intervals⁷ if this is confusing.)

Example 11.1

The key of D major has two sharps. Using the circle of fifths, we find that the most closely related major keys (one in each direction) are G major, with only one sharp, and A major, with three sharps. The relative minors of all of these keys (B minor, E minor, and F sharp minor) are also closely related to D major.

Exercise 11.1

What are the keys most closely related to E flat major? To A minor?

(*Solution on p. 63.*)

Exercise 11.2

Name the major and minor keys for each key signature.

(*Solution on p. 63.*)

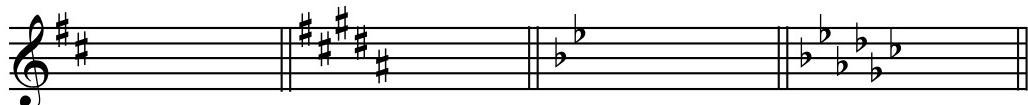


Figure 11.2

11.2 Key Signatures

If you do not know the order of the sharps and flats, you can also use the circle of fifths to find these. The first sharp in a key signature is always F sharp; the second sharp in a key signature is always (a perfect fifth away) C sharp; the third is always G sharp, and so on, all the way to B sharp.

The first flat in a key signature is always B flat (the same as the last sharp); the second is always E flat, and so on, all the way to F flat. Notice that, just as with the key signatures, you add sharps or subtract flats as you go clockwise around the circle, and add flats or subtract sharps as you go counterclockwise.

⁷"Interval": Section Inverting Intervals <<http://cnx.org/content/m10867/latest/#s3>>

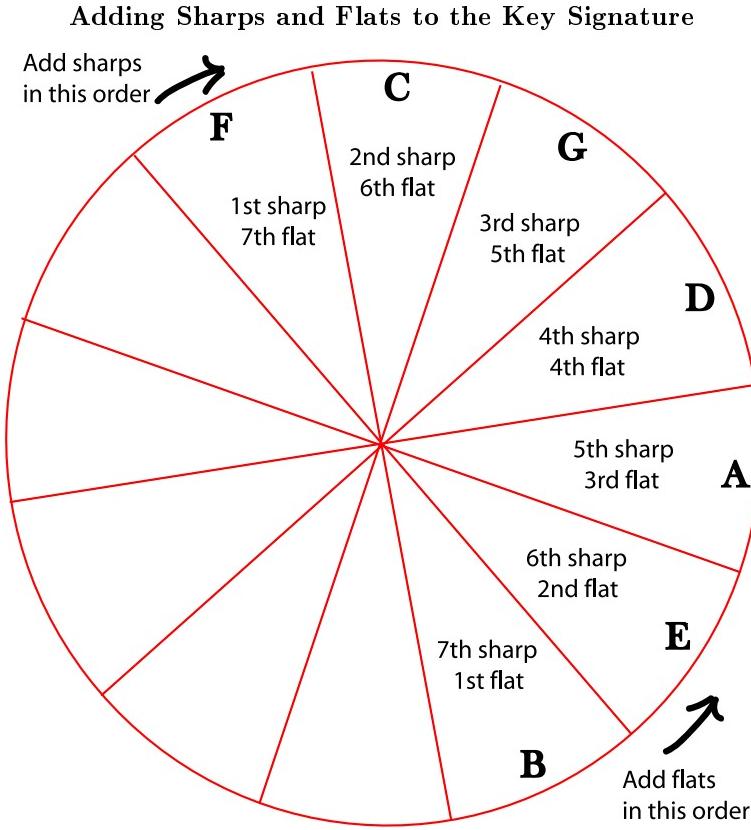


Figure 11.3: Each sharp and flat that is added to a key signature is also a perfect fifth away from the last sharp or flat that was added.

Exercise 11.3

(*Solution on p. 63.*)

Figure 11.1 (Circle of Fifths) shows that D major has 2 sharps; Figure 11.3 (Adding Sharps and Flats to the Key Signature) shows that they are F sharp and C sharp. After D major, name the next four sharp keys, and name the sharp that is added with each key.

Exercise 11.4

(*Solution on p. 63.*)

E minor is the first sharp minor key; the first sharp added in both major and minor keys is always F sharp. Name the next three sharp minor keys, and the sharp that is added in each key.

Exercise 11.5

(*Solution on p. 64.*)

After B flat major, name the next four flat keys, and name the flat that is added with each key.

Solutions to Exercises in Chapter 11

Solution to Exercise 11.1 (p. 61)

E flat major (3 flats):

- B flat major (2 flats)
- A flat major (4 flats)
- C minor (3 flats)
- G minor (2 flats)
- F minor (4 flats)

A minor (no sharps or flats):

- E minor (1 sharp)
- D minor (1 flat)
- C major (no sharps or flats)
- G major (1 sharp)
- F major (1 flat)

Solution to Exercise 11.2 (p. 61)

D major
B minor B major
G sharp minor B flat major
G minor G flat major
E flat minor

Figure 11.4

Solution to Exercise 11.3 (p. 62)

- A major adds G sharp
- E major adds D sharp
- B major adds A sharp
- F sharp major adds E sharp

G major D major A major E major B major F sharp major

Figure 11.5

Solution to Exercise 11.4 (p. 62)

- B minor adds C sharp

- F sharp minor adds G sharp
- C sharp minor adds D sharp

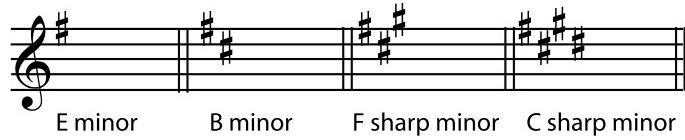


Figure 11.6

Solution to Exercise 11.5 (p. 62)

- E flat major adds A flat
- A flat major adds D flat
- D flat major adds G flat
- G flat major adds C flat

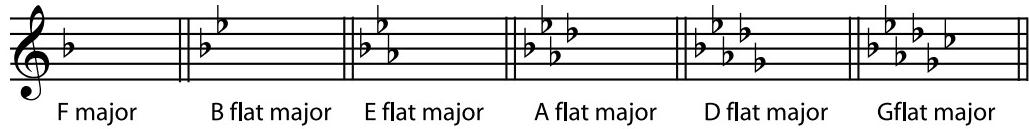


Figure 11.7

Index of Keywords and Terms

Keywords are listed by the section with that keyword (page numbers are in parentheses). Keywords do not necessarily appear in the text of the page. They are merely associated with that section. *Ex.* apples, § 1.1 (1) **Terms** are referenced by the page they appear on. *Ex.* apples, 1

- A** accidentals, 27
- B** bass clef, § 2(7), 7
- C** C clef, § 2(7), 9
chromatic, § 5(29)
clef, § 1(1), § 2(7)
clef symbol, 7
- D** degree, § 9(47)
diatonic, § 5(29)
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double flat, 28
double sharp, 28
- E** enharmonic, § 4(25), § 10(51), 52
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- F** F clef, 10
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flat sign, 26
flats, § 10(51), § 11(59)
- G** G clef, 10
- H** half, § 5(29)
- K** key, § 7(35), 41, § 10(51)
key signature, § 7(35), 35, 43, § 10(51),
§ 11(59)
keyboard, § 3(19)
keys, § 8(41)
- L** leading, § 9(47)
ledger, § 1(1)
line, § 1(1)
- M** major, § 7(35)
major keys, § 8(41), § 11(59)
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minor keys, § 11(59)
music, § 1(1), § 2(7), § 4(25), § 5(29), § 7(35),
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- N** natural, § 4(25), 25
notation, § 1(1), § 2(7), § 3(19), § 4(25),
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note, § 1(1)
- O** octave, § 6(33)
- P** piano, § 3(19)
pitch, § 1(1), § 4(25), 25, § 6(33)
- R** related keys, § 11(59)
- S** scale, 41, § 9(47)
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submediant, § 9(47)
supertonic, § 9(47)
- T** tonal center, 42
tonic, 42, § 9(47)
treble, § 2(7)
treble clef, § 2(7), 7
- W** whole, § 5(29)

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Music Fundamentals 1: Pitch and Major Scales and Keys

This collection is the first of five dealing with the rudiments of music.

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